

# The Iron Age

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A Review of the Hardware, Iron and Metal Trades.

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## METALLURGICAL NOTES.

### Treatment of Phosphoric Pig Iron.

A patent has been granted to Sidney Gilchrist Thomas, of Palace Chambers, Westminster Bridge, London, for an improved process by which phosphate of soda or potash are manufactured from their carbonates or hydrates by means of the phosphoric acid produced by oxidizing highly phosphoric molten iron in the presence of these bodies. The phosphoric iron employed to effect the decomposition should be very high in phosphorus, and should be first decarburized and desilicified in a silicious lined Bessemer vessel before running it into the vessel which contains the carbonate. The highly phosphoric iron made by smelting calcareous phosphoric slag with silicious phosphoric iron ore, or puddling cinder, is the material best adapted for the process. The phosphorus content of iron made in this way may be made to range between 6 and 30 per cent., and an iron phosphite or ferrophosphorus containing very little carbon or silicon may be produced. The carbon in this phosphorus iron will, as a rule, be lower in adverse proportion to the content of phosphorus. When the carbon and silicon have been thus reduced very low by increasing the phosphorus the metal may be run direct into the decomposing furnace without prior decarburization. Mr. Thomas prefers to effect the decomposition of the alkali in a Siemens gas furnace, though a converter may be used. This must have a basic or neutral lined hearth. If it is desired to convert the whole or nearly the whole of the phosphorus in the iron into sodic phosphate, it being assumed that sodic carbonate, as the cheapest salt, will be generally used, carbonate of about six times the weight of the phosphorus in the molten iron used to effect the decomposition is employed as a charge. To make the process commercially and technically successful it is absolutely necessary to provide against the very considerable volatilization and loss of the alkali which, under ordinary circumstances, would be so excessive as to be prohibitive. Before the molten metal is run in a part of the carbonate of soda is placed on the furnace hearth, previously brought to a high temperature, and covered with oxide of iron to retard its volatilization, and then immediately the molten metal is run in, when a brisk reaction at once takes place. If it is for any reason specially convenient to use in the decomposing furnace phosphoric iron with a considerable content of carbon, say, over 1 per cent., it is better to defer the addition of even the first part of the soda charge till the carbon is nearly removed. It is preferred to add the further quantity of soda making up the total charge by blowing it in through tuyeres, so as not to cause a too violent reaction. If the layer of slag grows so thick as to prevent the heat reaching the metal, and thus cooling the bath, a part should be run off, care being taken so to adjust the addition and tapping of slag as always to keep the iron quite fluid. When the reaction appears to be at an end and the metal to be deprived of its phosphorus, the slag is tapped off into bogies, and the metal finished in the usual way. The removal of phosphorus from the iron employed in the process, particularly when the initial content of phosphorus is not very high, will be found remarkably complete. If a Bessemer converter has been employed, which is only permissible when treating metal with a very great initial heat, the greater part of the soda should be blown in through the tuyeres with a blast preferably heated to at least 300° C., and the greatest care must be taken to stop the introduction of soda directly the metal blows cold. If all the phosphorus has not at this point been removed it is best to finish the removal with lime. In this case also the soda should only be introduced when the metal is entirely or nearly free from carbon. The slag obtained by either of the methods above described consists essentially of phosphate of soda or potash. It may be used directly as a manure or lixiviated in tanks to free it from oxide of iron and other bases. Phosphate of soda may be obtained by evaporation of the solution, or it may be otherwise utilized by well-known means.

### Plant and Processes.

A brick for regenerative furnaces, constructed with tongues and grooves, so that all the bricks may interlock, has been patented by S. A. Richards, of Joliet, Ill. The body of the brick is of substantially uniform thickness. The top and bottom are smooth, but each side is provided with two projecting vertical ribs, equidistant from the center of the brick. Between the ribs is thus formed a vertical groove, preferably of wave-like contour in cross-section. This groove is adapted to receive the tongued end of the adjoining brick placed at right angles. The flues of a furnace built of these bricks have rounded corners, which is desirable in preventing the accumulation of dust. The bricks of one course are laid to break joints with those of the next course.

T. G. Kirkpatrick, of Leechburg, Pa., has patented a regenerator furnace for the use of natural gas. The inventor states that by mixing natural gas, as obtained from the earth, with a small proportion of atmospheric air the mixture may be ignited within a furnace without danger of explosion. The furnace employed is a modification of the Siemens regenerator furnace. The modifi-

cation consists mainly in substituting a gas chamber for the usual gas reservoir, and providing the gas chamber with a valved air port to permit a small percentage of air to enter. This air supports a low combustion prior to the complete combustion which takes place on the hearth, where the pre-heated air from the air regenerator meets the gas issuing from the gas chamber. Air and gas reversing-valves are provided, and also a reversing-valve for controlling the steamways.

A metallurgic furnace operated by means of natural or other gas has been patented by T. G. Kirkpatrick, of Leechburg, Pa. The air and gas are not heated within a regenerator, as usual, but in a stove through which the waste products of combustion are made to rise. The products of combustion

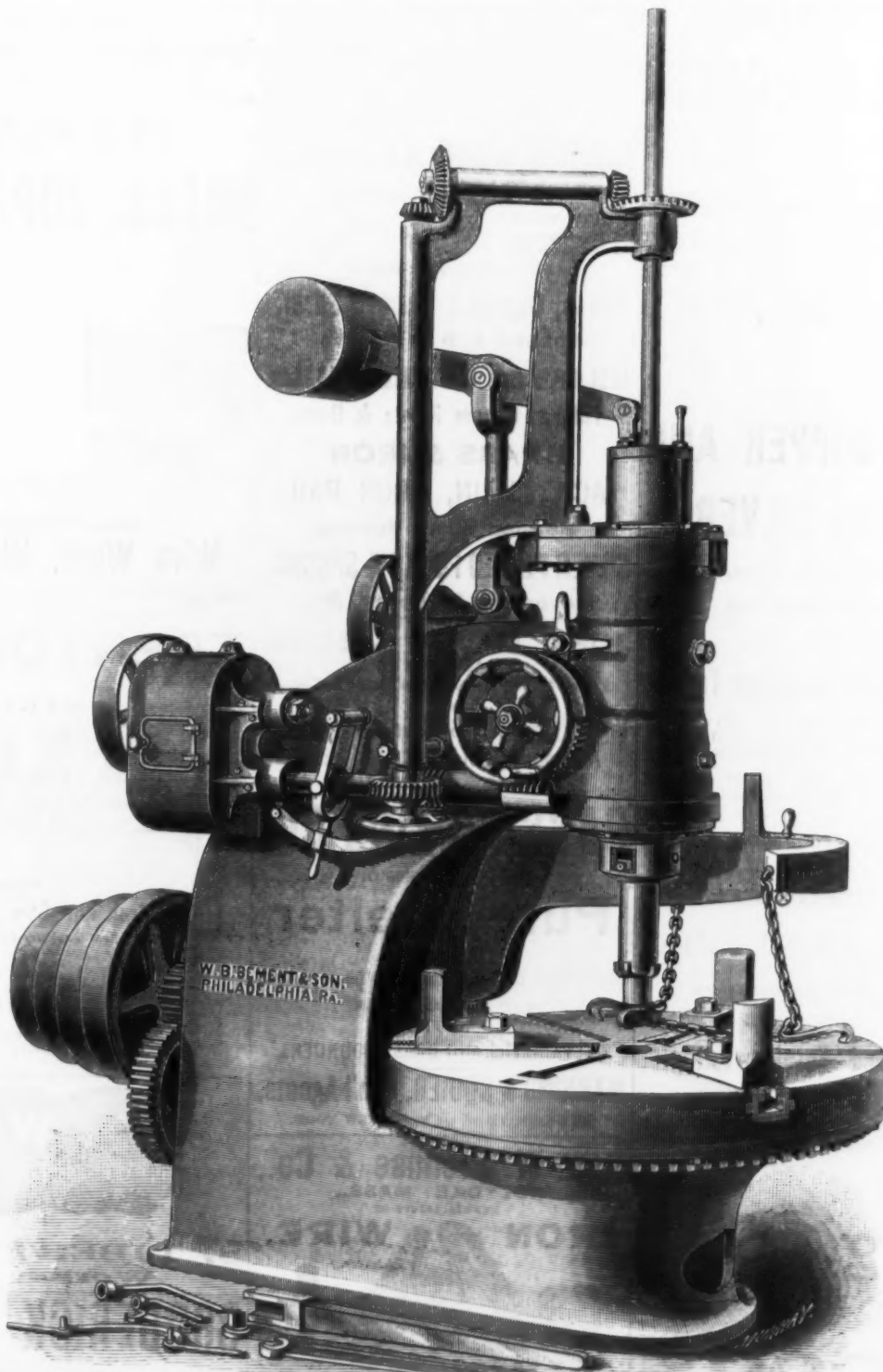
### New 48-Inch Car-Wheel Boring Machine.

Messrs. W. B. Bement & Son, of Philadelphia, Pa., are now building the new car-wheel boring machine shown in the annexed cut. The tool when managed with a moderate degree of skill is capable of producing accurate and uniform work with great rapidity, lending interest to the following particulars: The frame has the general outline used for many years by this firm for machines of this class, and is unusually strong. The bearing of the revolving table is made in the form of the Schiele curve, two such parts of one continuous curve being combined as will give the required vertical and lateral support, and at the same time maintain their uniformity of bearing. The three

can be brought into the same position for any number of wheels successively. The wheels are raised and lowered by a vertical screw, which is caused to revolve rapidly in either direction by the movement of a lever, and upon which the crane-arm is threaded and can be swung to any position. The wheel is caught by hooks fitting the flange and raised to the proper height. It is then swung inward until the crane-arm strikes a stop, when the wheel is centrally over the table, and can be lowered vertically into the chuck, no pushing or sliding being required.

### Gaseous Fuel in England.

Mr. Ellis Lever, of Bowden, Cheshire, writes to the London Times as follows:



NEW CAR-WHEEL BORING MACHINE, BUILT BY W. B. BEMENT & SON, PHILADELPHIA, PA.

from the working chamber pass into three upright passages at one end of it. They then enter a horizontal flue beneath the hearth and are finally discharged into the stove. This stove consists of an upright rectangular chamber built of fire-brick and placed so as to form one end of the hearth. Within the stove are arranged two series of stand-pipes. The first series contains air, which, after being heated by the products of combustion, is conducted to the work chamber. The second series is shorter than the first series, and is designed for the reception of the gases and for their conveyance to the work chamber. The inventor states that by his improvement he obtains a more regular and uniform heat than where the air and gas enter through regenerators.

Consul Baker, at Buenos Ayres, reports a general falling off in our trade with the Argentine Republic, but adds: "In view, however, of the present unpromising state of the general business of the Argentine Republic, it may be a fortunate thing that our trade is not at present so extended or as extensive in this direction as we could otherwise wish."

chuck jaws are concentrically tightened upon the wheel by a single movement of a lever, and are quickly adjustable to wheels of any diameter not exceeding 43 inches on the tread. The boring spindle is of large diameter, hollow, counterbalanced, and provided with quick and easy hand movement. Its wear is compensated for and its accurate alignment preserved by the use of the well-known split conical bushings, which in this case have large surfaces and can be rigidly clamped in any position to which they are adjusted.

The vertical boring feed is thrown into gear by a conical friction, and has six changes, which are operated by a sliding clutch-pin, a device so long in use as not to need explanation. L. R. Faught's patent quadruple cutter is much used as a boring tool in these machines, and is frequently fed through a finishing cut at the rate of 1/2 inch per revolution. The hub-facing device, shown in the cut, is also one patented by Mr. Faught. A slide which carries the facing tool receives a surfacing feed from a vertical shaft which passes centrally through the boring spindle, and may be actuated either by hand or by power. A gauge-screw is provided, by means of which the facing cutter

Never in the history of gas-making has gas been so excellent in quality and so cheap as it is at the present time, and never has there been such a development of inventive skill in the production of useful appliances for the utilization of gas fuel both for domestic and manufacturing purposes. The first great impetus to the application of gas for cooking and heating was given at the Grand Exposition held at Paris in 1875. Presumably one of the chief reasons why the attention of gas manufacturers was directed to an extended use of gas for purposes other than as an illuminant was that the wonderful discoveries, just then reported, of Mr. Edison and other electricians startled, and for a time scared, the gas companies and their engineers. They then began to perceive that there were other outlets for gas above and beyond lighting, and their attention was naturally devoted to the supply of gas for all heating, cooking and manufacturing purposes. One of the most important applications of gas since that date is its use in the working of engines, or the production of motive power, the necessity for steam boilers being thereby entirely dispensed with. So great has been the demand for gas engines that my neigh-

bors, Messrs. Crossley Brothers, have delivered up to the present time more than 15,000 of their "Otto" engines alone. Gas is now extensively used for iron smelting and steel converting, in the manufacture of glass, and in generating steam in connection with large industrial operations. At Carnforth, Lancashire, Swansea and elsewhere, iron and steel are treated entirely by gas as fuel, and at some of the largest collieries in the North of England the gas is conducted from the coke ovens to the furnaces and boilers, and so utilized in generating steam in lieu of coal firing. I could name very large works in Manchester and other places where gas only is used in the production of steam power. It is found to be economical and effective, and less destructive to fire-bars and boilers than the coal fire. At the same time there is an absence of smoke and soot.

I firmly believe, with the late Sir William Siemens, that the time is at hand when the use of coal fires for producing steam will be altogether abandoned. The present extravagant consumption of coal, partly, possibly, because it is very cheap, is nothing less than a wanton waste of the latent energy and reserve forces of our country. There are but three natural products in Great Britain of which we have sufficient for our own requirements and something to spare for exportation. These are coal, iron and salt. Our coal supplies are being exhausted at the rate of over 160,000,000 tons annually. At this rate, and the output is ever increasing, the time must come when our great subterranean coal store will be practically used up. Coal is not now being formed, and cannot be grown, as crops of corn or grass. Coal consumed is destroyed; not so iron, however, which can be used over and over again. When prices are high coal is economized, and we then hear much about the limited duration of our coal supplies. Now that it is cheap we hear little or nothing on the subject. It is, I believe, a fact that in the use of coal for firing steam boilers not more than 10 per cent. of the energy or heating power is utilized. The remainder, 90 per cent., is lost in smoke, soot and wasted heat. In open fires in dwelling-houses it is said that not more than 3 per cent. is really utilized. Surely it is high time that steps were taken to diminish this willful waste, which may lead to woeful want. It is this waste which produces the soot and smoke which pollute the atmosphere, are so injurious to health and destructive to vegetation, works of art, buildings, &c. The more general use of gas as fuel for all purposes will hasten the realization of the picture of "what London might be if its perennial pall of smoke were annihilated." That it is possible finally "to emancipate London from that pervading grime which makes life so intolerable to all who have not fallen from their native sense of cleanliness" is evident from the practical experience of many who have tried the experiment of gas instead of coal for heating purposes.

**A New Industrial Movement.**—The Society for Promoting Industrial Villages, a British organization, of which Lord Shaftesbury, Lord Aberdeen and Mr. Samuel Morley, M. P., are the vice-presidents, are about to take active steps to relieve the congested districts of the metropolis and other large towns by removing those whose work must be carried on in their own homes into villages, not to supplant, but to supplement, co-operative production by machinery. The first object of the society is stated in their circular to be "to ascertain the best means of establishing villages where manufactures and 'home industries' can be combined with the cultivation of cottage or co-operative farms, as a remedy for overcrowding in great cities and want of employment in agricultural districts." Within the last few weeks a co-operative farm has been started on the principle laid down by the society near Farnham, Surrey. It is especially devoted to market gardening, fruit and dairy farming. Some difficulty has been encountered in getting the laborers to understand that they are to share the profits instead of receiving wages, but this is being gradually overcome. Other industries have been introduced on the farm, such as stocking and jersey weaving, knitting and dress-making, and information has been collected by the society from persons interested in local factories and home industries.

**Virginia Tin Mines.**—Accompanying a prospectus of the Virginia Tin Mining and Mfg. Co., which we have recently received, is a report on the Martha Cash tin mines of Rockbridge County, Va., from which we take the following extract of a report made by Prof. A. S. McCreath and Mr. Franklin Platt, in 1883. After describing the course of the vein examined and the extent of the working, the report says: "An analysis of samples selected by Mr. Rittenhouse, representing all grades from pure tin crystals to quartz and rock holding little or no tin, showed by duplicate tests 31.76 and 31.44 per cent. metallic tin, being an average of 31.60 per cent. While this will probably represent fairly enough the average of the ore already mined, there is a good deal of vein matter which will yield much better, perhaps 70 per cent. and over. The largest piece of ore of this kind that we saw was not over 2 inches in thickness, and much of it was not more than 1 inch thick."



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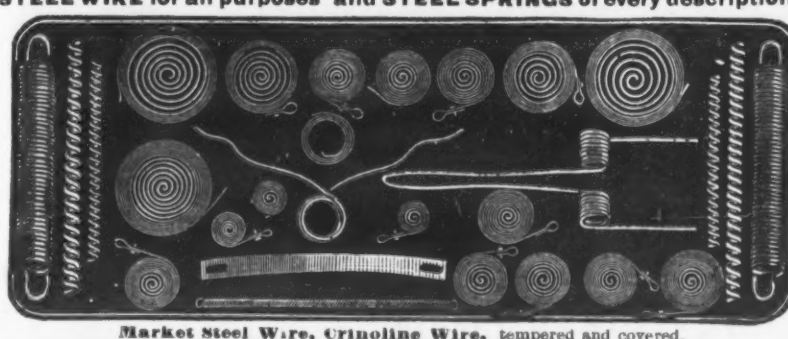
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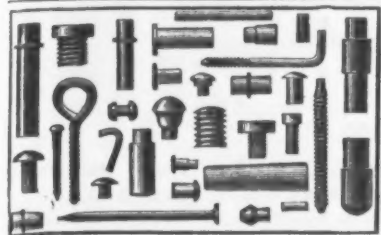


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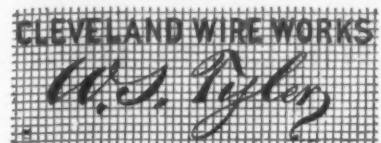
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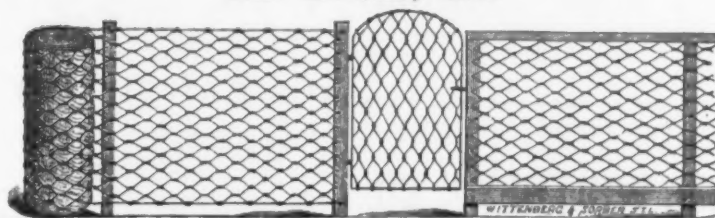


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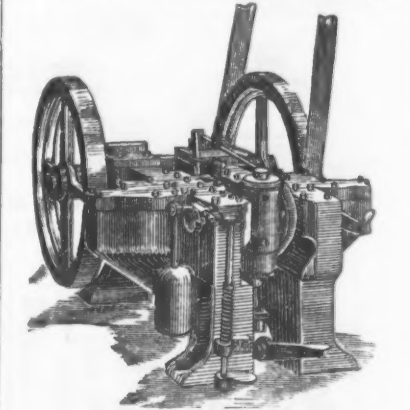
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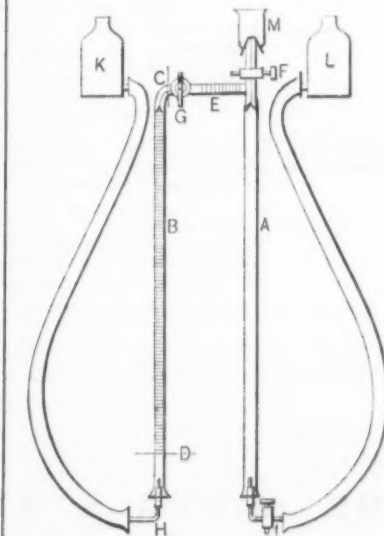
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## Analysis of Chimney Gases.

BY HARRY VAN ATTA.

The brief mention of the above subject made by the Committee on a Standard Method of Steam Boiler Trials, whose report was submitted at the New York meeting (November, 1884) of the American Society of Mechanical Engineers, leads me to present a detailed description, together with special points in the handling, of an instrument which I have used with success.

The apparatus (shown in accompanying cut) was devised by Professor Elliott, School of Mines, Columbia College, for accomplishing a rapid analysis of a mixture of gases, and is extensively used in gasworks. It consists of two glass tubes, A and B, connected at E by rubber tubing. A, the treating tube, is somewhat larger than B, the measuring tube. The former is plain, the latter graduated to cubic centimeters. Connected to these tubes by means of rubber tubing are the bottles K and L, which contain water, used in forcing gas from one tube to the other. The funnel M is used when chemicals, hereafter mentioned, are to be added. G and F are two-way valves, while I is a three-way valve. The gas to be analyzed is taken into the tube A. In order to accomplish this a hole is drilled in the flue directly behind the damper. In this is placed a piece of iron pipe, say 3/4-inch diameter, and clay or mortar placed around the same to prevent the entrance of air. This pipe is connected to the tube A by means of rubber tubing. The bottle L is disconnected, and the bottom of A is connected to a receiver having a valve for emptying its contents. Any air-tight vessel—a barrel, for instance—will answer for this purpose. In setting up and connecting the apparatus place the receiver below the level of the analyzer, and, where possible, both should be placed below the



Gas Analyzer.

hole in the flue. Fill the receiver and connections to flue with water, thus displacing all air; open the valve and allow water to run out of receiver. Suction is thus created, by means of which gas flows into the receiver. When a good volume of gas has been obtained, close valve in receiver, also valves F and I, thus confining the gas to be analyzed in tube A. This method of filling the treating tube with gas is recommended, because it does away with any slight error due to the presence of air in the small connecting tube E which water cannot displace. By the above means this small amount of air is taken into the receiver with a large volume of gas, and, when valves in glass tube are closed, no air is confined therein. Disconnect apparatus from chimney and receiver and reconnect bottle L. To prevent the introduction of any air this should be done in the following manner: When the three-way valve I is closed before receiver is disconnected, it is turned so that a connection is made from the air through the valve to the air again. By connecting L when valve is in this position water will flow through the valve into the air. While this is occurring turn valve I so water will flow into tube A. Expertness in handling the apparatus is simply a matter of practice. The method of procedure during the analysis of the gas is as follows:

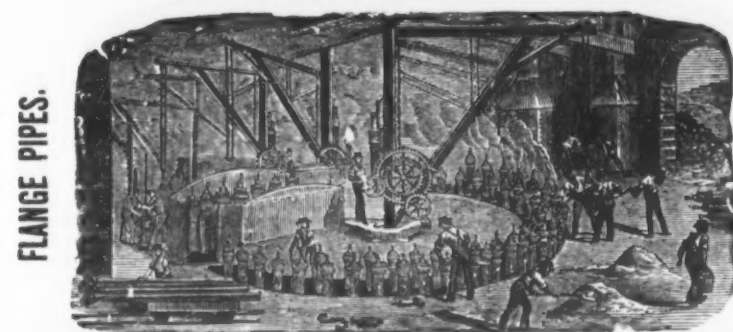
Remove apparatus to a place where it will not be exposed to sudden variations of temperature. Allow gas to flow in measuring tube B until a given volume, say 100 cc., is secured. Any gas remaining in A must be forced out through valve F and tube completely filled with water. The gas from B is forced into A and a chemical added. The funnel M holds a sufficient quantity. Care should be taken not to allow any air to enter while chemical is being added. This is accomplished by not allowing all the chemical to flow out of funnel. The gas is now forced into A and measured. The difference between its present and previous volumes will give the amount of the gas for which absorbent was added. In making measurements of the different volumes time must be allowed for the entire dissipation of the heat generated by the chemical reaction. Readings should be taken at equal intervals of time, say three or five minutes, until no difference of volume is noticeable. Force gas back into treating tube and add other chemicals, measuring after each treatment. Before gas is forced into treating tube, while measurement readings are being taken, wash out tube A thoroughly with water to remove traces of previous chemical. The order in which chemicals should be added is as follows:

1. Caustic potash—to absorb carbonic acid.
  2. Potassium pyrogallate—to absorb free oxygen.
  3. Cuprous chloride in concentrated hydrochloric-acid solution—to absorb carbonic oxide.
- What remains in the tube is nitrogen. In connection with the above there is an explosion test for determining amount of



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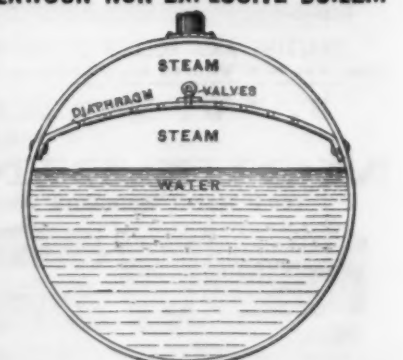
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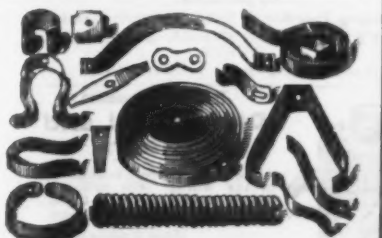
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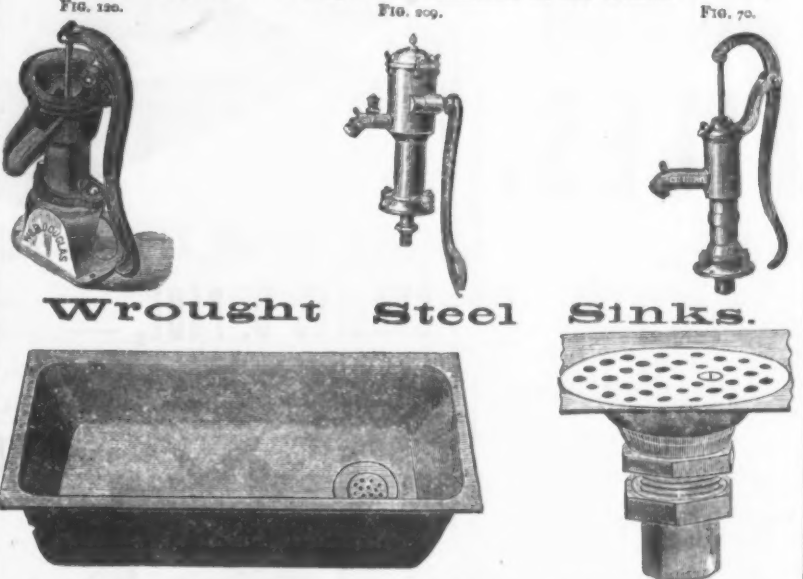
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hydrogen, and bromine should be added after potassium pyrogallate test, to determine presence of olefiant gas and acetylene. In connection with an analysis of chimney gas these are omitted. The measurements obtained by this apparatus are volumetric, and to be of practical value must be reduced to equivalent weights. In making this transformation the atomic weights of the different gases are used. These are:

Carbonic acid, $CO_2$	44
Carbonic oxide, $CO$	28
Oxygen, $O$	16
Nitrogen, $N$	14

Letting  $f$   $CO_2$ ,  $f$   $CO$ ,  $f$   $O$  and  $f$   $N$  represent the percentages by volume of the carbonic acid, carbonic oxide, oxygen and nitrogen in the gas as found by the above analysis, we have:

$$f CO_2 \times 44 + f CO \times 28 + f O \times 16 + f N \times 14 = S \text{ (a certain sum.)}$$

$$\frac{f CO_2 \times 44}{S} = \text{percentage by weight of carbonic acid.}$$

$$\frac{f CO \times 28}{S} = \text{percentage by weight of carbonic oxide.}$$

$$\frac{f O \times 16}{S} = \text{percentage by weight of oxygen.}$$

$$\frac{f N \times 14}{S} = \text{percentage by weight of nitrogen.}$$

To determine the amount of air supplied, it is necessary first to find the relative amounts of carbon and oxygen in the chimney gas, from which the amount of air is easily determined. The total oxygen is made up of two parts—free and combined. Of a given weight of carbonic acid  $\frac{11}{7}$  is oxygen; of a given weight of carbonic oxide  $\frac{8}{7}$  is oxygen. The total oxygen thus is:

$$O = \frac{8 f CO_2 \times 44}{11 S} + \frac{4 f CO \times 28}{7 S} + \frac{f O \times 16}{S}$$

The total carbon is:

$$C = \frac{3 f CO_2 \times 44}{11 S} + \frac{3 f CO \times 28}{7 S}$$

$$O = \frac{32 f CO_2 + 16 f CO + 16 f O}{2 f CO_2 + 12 f CO}$$

$$C = \frac{4 \left( \frac{2 f CO_2 + f CO + f O}{f CO_2 + f CO} \right)}{3}$$

Since 1 pound of air contains .23 pound oxygen, the number of pounds of air supplied per pound of carbon is:

$$\text{Air} = .58 \left( \frac{2 f CO_2 + f CO + f O}{f CO_2 + f CO} \right)$$

To determine the relation the air for dilution bears to the air for combustion, we have simply to find the ratio of the free to the combined oxygen, thus:

$$\text{Free oxygen} = \frac{f O \times 16}{S}$$

$$\text{Com. oxygen} = \frac{8 f CO_2 \times 44}{11 S} + \frac{4 f CO \times 28}{7 S}$$

$$\text{Free } O = \frac{f O}{2 f CO_2 + f CO}$$

The practical value of an analysis of chimney gases in connection with boiler tests is: First.—It enables us to form a tolerably correct judgment of the degree of perfection with which fuel is burned, and hence decides for any given class or setting of boiler the position of the damper to obtain maximum evaporation with minimum consumption of fuel. Too much air is as great an evil as too little. The dimensions of chimneys depend, among other things, on the amount of air supplied per pound of fuel burned. The ratio of the amount of air for the dilution of the gaseous products of combustion to that necessary for combustion is variously estimated. It is generally taken from  $\frac{1}{4}$  to 1. An analysis of the products of combustion gives us the proper means of determining this ratio.

Second.—It gives us a means of determining the extent of each of the various losses on account of which the available heat below the total heat of combustion of fuel in an ordinary furnace.

The available heat of combustion of a pound of any fuel falls short of the total heat from several causes. These are:

1. Waste of unburnt fuel in the solid state.

2. Waste of unburnt fuel in the gaseous state.

3. Waste from ashes and clinkers.

4. Waste by external radiation and conduction.

5. Waste by air in the chimney.

By careful firing the first will be reduced to from nothing to  $\frac{2}{3}$  per cent. A sufficient supply and proper distribution of air will entirely prevent the second. The third will be placed at about 12 per cent. The fourth varies with greater or less exposure, but its value is about 15 per cent. The fifth, we have the data from which its value may be accurately determined. Box, in his 'Practical Treatise on Heat,' places its value at 20 per cent. This, I think, is too high. Its value depends on temperature of air on entering grate; temperature of gases on entering chimney; amount of moisture in the air; quantity of air supplied. The presence of moisture has so small an effect, not over 5 per cent. of the total, that we can neglect it in the following, letting:

$N$  = number of pounds of air as determined.

$t$  = temperature of escaping air.

$t_1$  = temperature of external air.

$s$  = specific heat of the same.

$N(t - t_1)s$  = heat-units carried off by the escaping gases.

An example:

Air for combustion and dilution. 20lb.

Temperature of chimney. 410°

Temperature of external air. 65°

Specific heat. .238

Loss =  $20 \times (410 - 65) \times .238 = 1642.2$

heat-units. Assuming 12,500 as the total

heat-units in 1 pound of coal, the loss above

is 13.1 per cent.

Prof. W. R. Johnson, in his elaborate

report on 'American Coals,' submitted to

the Secretary of the Navy, in 1844, shows

that of the total evaporative power of the

different coals tested the average percent-

age expended on the products of combustion

was 15.96.

With the aid of this apparatus we are

enabled to determine exactly the amount of

each loss on account of the sum on which

the available falls below the total heat of combustion.

An analysis of the coal reveals the total heat of combustion. Johnson's experiments point to the fact that the weight of carbon alone is the only available element in the heating power of coal. The determined evaporative power gives the available heat. All other sources of loss except radiation are capable of exact determination by experiment. Hence, by difference, this also may be found.—*Mechanics.*

**TRADE PUBLICATIONS.****Terra-Cotta.**

The new catalogue issued by Messrs. True, Brunkhorst & Co., Chicago, Ill., doing business under the style of Northwestern Terra-Cotta Works, is an oblong pamphlet measuring 11 x 16 inches, and containing 26 plates. The cover may be described as red terra-cotta in color, on the first page of which, an effective and appropriate design by P. C. Lautrup, is printed in black. The fourth page shows a view of the kilns of the company, the inside pages being blank. We are thus particular in describing the cover, for it is one of the best features of the work. Owing to an unfortunate selection in the way of paper and in the color of the ink in which the work has been done, the pages of the book proper are far less attractive than the labor expended in their preparation and the really meritorious work shown by the engravings would justify. The inside pages of the book are of a thick, soft paper, light olive in color, on which the designs are printed in sepia. Much of the effect that might have been produced at the same cost has been totally lost, and accordingly the book does not show in proportion to its real value. A number of the designs shown, which include almost everything that can be made to advantage out of terra-cotta, have been delineated by Mr. Lautrup. His drawing is spirited and is well adapted to the representation of the particular class of work under consideration. In the space that we can devote to the subject we cannot undertake to describe the patterns presented. Suffice it to say there is much in the work that will repay study, and also much that is adapted to the every day requirements of architects and builders. The success of this firm in introducing terra-cotta in the Northwest is well known, and their catalogue should be in every office.

**The Benner Iron Works.**

The catalogue issued by Messrs. M. Benner & Co., 262 South Jefferson street, Chicago, Ill., contains 188 pages, and is profusely illustrated, the engravings showing more or less of almost every line of goods manufactured by or dealt in by this firm. Of these no less than 22 kinds are enumerated. The business of this house, in brief, is builders' ironwork, both wrought and cast, of every description, including fences, erections, shutters, fire escapes, jailwork, beams, columns, &c. Of store fronts and columns none are shown, it being explained that for the most part architects prefer making their own designs. The illustrations are printed upon tint, in which are engraved the style of the firm and its location, so that every page of the work is an advertisement of the house putting it out, no matter how much it may be mutilated. A very handsome assortment of designs of fences, gates and railings is presented, among which are a number of very recent designs. Following this, one of the largest and best collections of erections is given which we have recently had the pleasure of inspecting. These are accompanied by a judicious selection of finials, embracing a number of new designs. Window guards, stair railing, newel posts, balcony brackets, rosettes, scrolls and other similar work are presented. Jailwork is also illustrated. Lawn furniture, stable fittings, summer-houses, verandas, wrought chandeliers, shutters, vault lights and fire escapes go to complete the work. Some tables valuable to architects, engineers and builders are included in the book.

**Ironmonger Diary for 1885.**

We have received a copy of the *Ironmonger Diary and Text-Book* for the year 1885, which contains the usual amount of valuable information. The diary, which is interleaved with sheets of blotting paper, is arranged in a convenient manner, each of the pages being divided into the blanks for one week. Exclusive of advertisements, about 60 pages of the book are filled with miscellaneous matter, comprising tables and statistics useful for reference, besides many items of general interest. While some of the tables and articles are of local interest, so to speak, such as the English railway classification of goods, English postal charges, &c., there is much other information of general value to readers outside of Great Britain or her colonies. As one of the chief features in the work, the publishers call attention to a special and practical article, with information from official sources, of the rules and regulations as to fittings on the principal water works in Great Britain, and also to an article on testing house-drainage and sanitary appliances.

**Japanese Dental Instruments.**—The Japanese market must be an unsatisfactory one for the manufacturer of dental instruments. It is asserted that the Japanese dentist performs all his operations of tooth-drawing with the thumb and forefinger of one hand, and thus he never terrifies his patients with an array of steel instruments. The skill necessary to do this is only acquired by long practice, but once it is obtained the operator is able to extract without a half-dozen teeth in 30 seconds without once removing his fingers from the patient's mouth. The dentist's education commences with the pulling out of pegs that have been pressed into soft wood; it ends with the drawing of hard pegs which have been driven into an oak plank with a mallet. It is said that no human jaw can resist the delicate but powerful manipulation of the Japanese dentist.

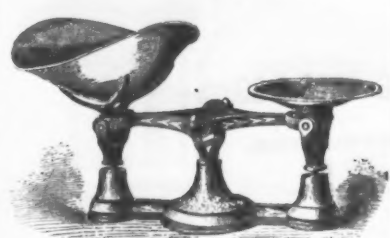






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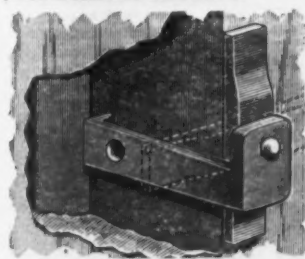
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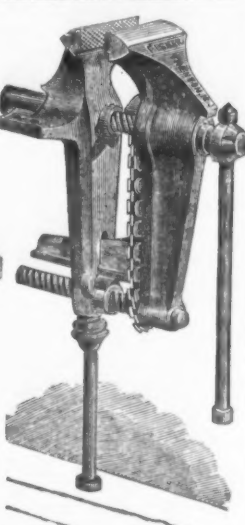
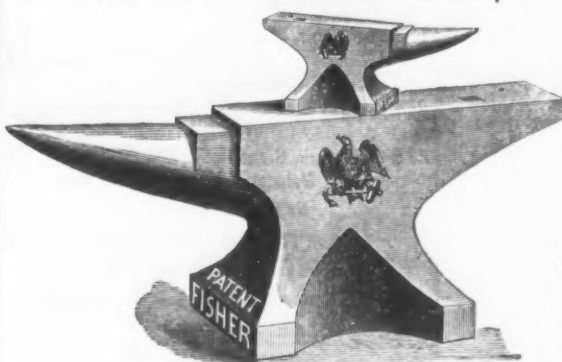
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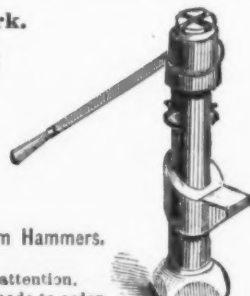
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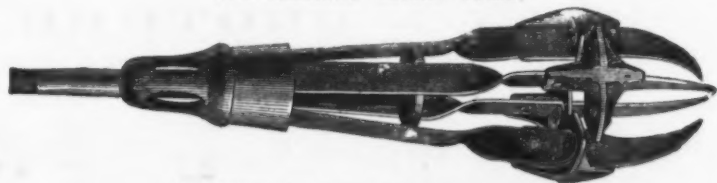
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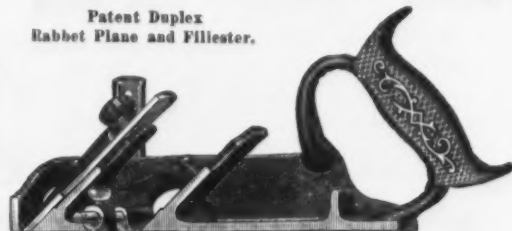
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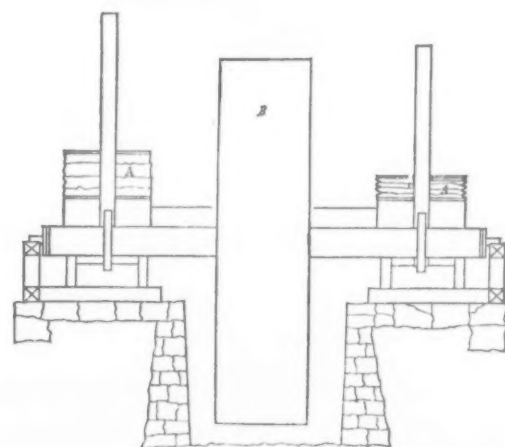
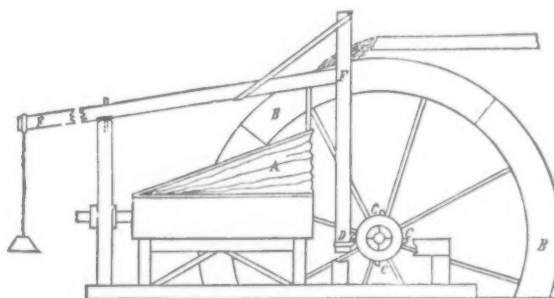
## The Salisbury Iron Region.

We reprint from the *Journal of the United States Association of Charcoal Iron Workers* the following interesting article on the Salisbury iron region:

We lately spent several days in the group of charcoal blast furnaces generally recognized as the "Salisbury region" in Western Connecticut and Massachusetts and South-eastern New York. Few who know of this district realize that east of the Hudson River,

York City and the Continental troops lay along the Hudson River, when some teamster brought as his back load the news of the Boston tea-party, or of the battle of Bunker Hills, or when some charcoal burner carried from furnace to coal job the news that independence had been declared.

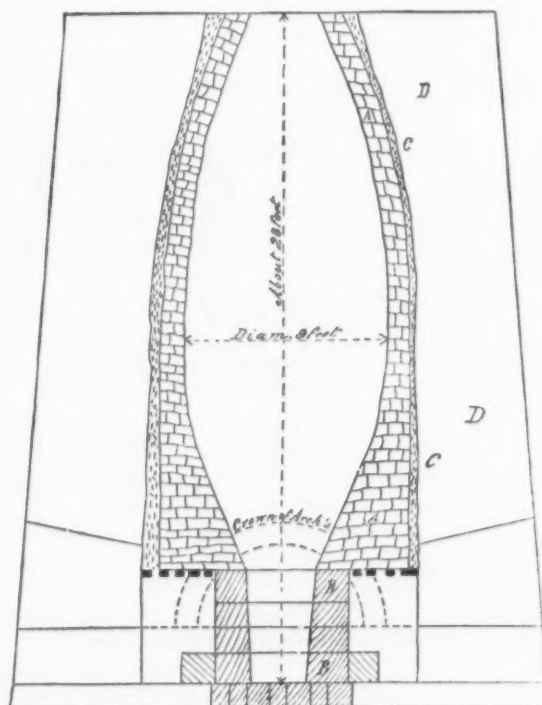
About the year 1743 a forge was erected in the present village of Lakeville, Conn., then called Furnace Village, and in 1762 Ethan Allen (of Ticonderoga fame) and others purchased the property and built a blast fur-



Blowing Apparatus at the Old Charcoal Blast Furnace at Lakeville, Conn.

and within about 100 miles of New York City, there are still in existence 19 charcoal blast furnaces. They are not, however, all in the Salisbury region proper, although by generally accepted usage they are so considered. Salisbury is the northwestern town or township of Litchfield County, Conn., and about its center is Salisbury Village, near which hematite iron-ore mines, called respectively the "Old Hill," "Davis" and "Chatfield" ore beds, are located on the eastern slope of the Taconic range of hills. These mines have been worked for a long time. As early as 1734 a forge was erected in the village of Lime Rock, and the ore for it was procured from the Davis Mine. Mr. James F. Lewis states that Old Hill Mine was first opened in 1731, and the ore carried "in leather bags on horseback to 'Ousatonic,' Mass., 16 miles, and worked in forges." He gives the date of opening the Davis Mine as 1732, and the Chatfield Mine as 1740. He also states that the Porter and Kent Mines,

nace, which is supposed to have been the first blast furnace built in the State. Through the courtesy of the Barnum-Richardson Company we are enabled to present a sectional view of this old furnace, showing its form and size as nearly as can be made out from the data now in existence. The product of this old furnace was 2½ tons of iron in 24 hours. Three tons of ore and 250 bushels of charcoal were used per ton of iron. The lining A A of the furnace was slate; the crucible and bosh B B "fire-stone," from Haverstraw, on the Hudson; the backing C C yellow clay used for grouting, and the masonry of the stack D D was white limestone from the Lakeville quarries. In 1768 the property was sold to an English gentleman, who ran it successfully till the War of the Revolution began, when, being a royalist, he left the country and the furnace without an agent. The property was not confiscated, but the State took possession of it and proceeded to manufacture cannon,



Sectional View of Old Charcoal Blast Furnace at Lakeville, Conn.

in Connecticut, have been opened for about 100 years, and that the mines in Berkshire County, Mass., and some in Dutchess and Columbia counties, N. Y., are very old.

Gradually, as other ore beds in adjacent territories were opened, iron works increased in number, and the aggregation of iron industries centered in the district comprising the southwestern corner of Massachusetts, the western boundary of Connecticut and the adjacent portion of the State of New York became recognized as the "Salisbury region," although the owners of the old Salisbury mines claim that only the furnaces using their ores should be so designated. The general topographical features of the region are most attractive, and nature has generously provided picturesque surroundings for the mines and blast furnaces. Mount Riga rises in bold relief close to the older mines, while off to the north Mount Everett stands "in solemn grandeur." The traveler is constantly surprised by beautiful lakes or charming waterfalls nestled among the hills, the most noted of the latter being probably the Bash Bish Falls, close to the Copake Iron Works. Nor are the historic surroundings less inviting than the scenery, and little imagination is needed to picture the conditions at the old charcoal blast furnaces when the British army occupied New

cannon balls, shells, &c., for the General Government, of which large quantities were produced. The severe tests applied to these guns in proving them established at this early period the high character of the iron for tenacity and great strength. Large numbers of potash kettles weighing nearly ½ ton each, and pig iron for forges and foundries, were also produced by the furnace, which continued to be the only blast furnace in that section for a long time. The ship Constitution ("Old Ironsides") and the battery in New York were armed with the Salisbury cannon. After the war the navy was to a considerable extent supplied with guns from the Salisbury region.

In 1781 a forge was built on Mount Riga, and for many years the works were known as "Ball's Forge." A furnace was partially constructed at Mount Riga about 1806, and finished in 1810, which for many years carried on an extensive and profitable business in the manufacture of pig iron, anchors, screws and various kinds of merchant iron. These works, and those at Lakeville, have, however, long been abandoned. The first foundry for remelting pig iron was built in Lime Rock, a village in the southern corner of the town of Salisbury, about the year 1830; the production, consisting chiefly of clock and sash weights, plow castings



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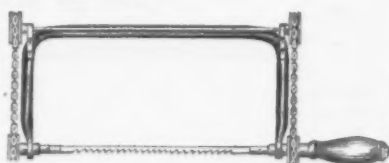
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SLEIGH BELLS,

House, Tea, Hand,

Gong Bells, &amp;c.

Bell Metal Kettles.

Established 1838.

Bevin Bros. Mfg Co.,

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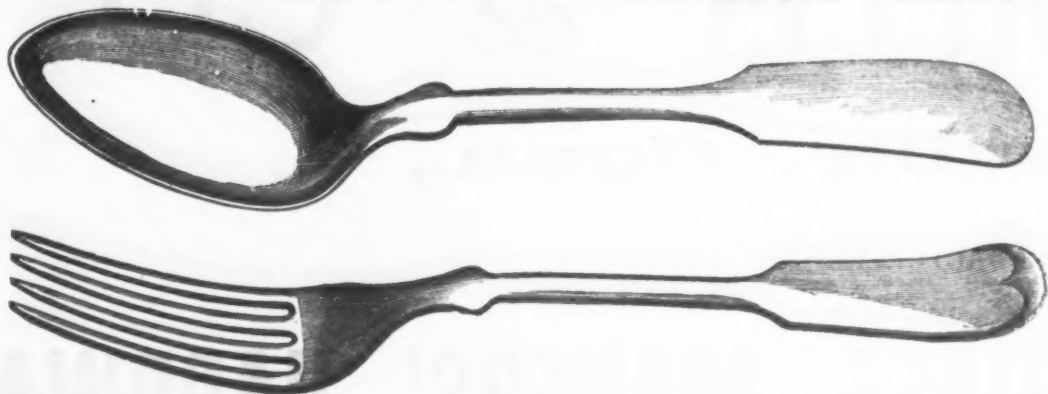
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House, Tea, Hand,



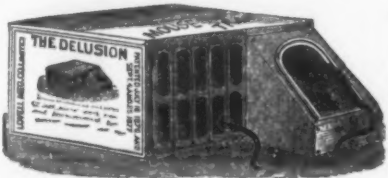
# HALL & ELTON'S GERMAN SILVER.



In addition to Spoons of this well-known brand, we are now prepared to furnish Forks of the same quality. We GUARANTEE these goods to be SOLID and of UNIFORM quality throughout, with no coatings to wear through or flake off, and with no liability to RUST.

HALL, ELTON & CO. Wallingford, Conn., and 47 East 13th St., New York.

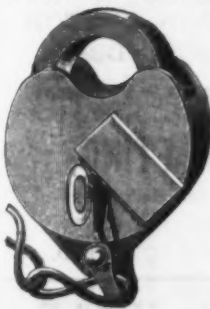
## THE DELUSION MOUSE TRAP.



The Mouse goes in to get the bait. And then he jumps right through a hole. And thinks he's out; but, bless his soul! He's in a cage, somehow or other, And sets the trap to catch another.

MANUFACTURED EXCLUSIVELY BY THE  
LOVELL MFG. CO., LIMITED,  
ERIE, PA.

## PENN LOCK WORKS, Phil.



BRASS  
PADLOCKS  
Of Every Description.  
HEAVY BRASS  
SWITCH AND  
CAR PADLOCKS  
A SPECIALTY.  
G. W. NOCK,  
142 North 4th St.,  
PHILADELPHIA.



WIRE.

## W. H. McMILLAN,

113 South St. (Up-stairs), Bet. Peck Slip and Beekman St.,  
NEW YORK,

### BLOCK AND PUMP MANUFACTURER.

Manufacturer of Inside Iron Strap and all kinds Tackle Blocks,  
MAST HOOPS, HANKS, BELAYING PINS, HAND SPIKES, HAND PUMPS, &c.

Also Dealer in Lignumvite Wood, for Beam Faces and Roller Beds, &c.

NO OIL REQUIRED.

Office, "Nassau 142," Factory, "Williamsburg 377."

FACTORY:  
32 to 40 Penn St., Brooklyn, E. D.

SOLE AGENT FOR

John Smalley's Graphite Bushings.

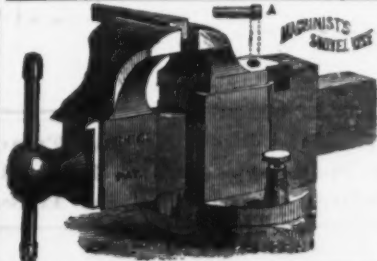
## A SPLENDID RAILROAD FENCE.

THE BUCK-THORN FENCE, as constructed by the Pennsylvania Railroad Company, is superb in every respect—unquestionably the finest and best in the United States. They use four strands, with posts painted green, 20 feet apart. Look at it as you ride from New York to Philadelphia. You will have no difficulty in distinguishing it from barb wire.

Sold by more than 3000 agents in the United States and Canada.

Exclusive agencies only. Sample and circulars free.

THE BUCK-THORN FENCE CO. Trenton, N. J.



## PRENTISS' PAT. VISES.

Adjustable Jaw.

Stationary or Pat. Swivel Bottoms.

ADAPTED TO ALL KINDS OF VISE WORK. ALSO

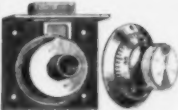
"PEERLESS" SWIVEL PIPE GRIP.

FITS ANY VISE. SOLD BY THE TRADE.

PRENTISS VISE CO.,

93 Day Street, New York.

SOLE PROPRIETORS. SEND FOR CIRCULAR



No. 300.

Drawer Lock.

## "CHAMPION" Combination Locks,

for Drawers, Closets, Ball-Tops, Tool Chests, Tin Cans, Boxes, Small Iron Doors, &c. Made throughout of brass, with handsome Plated Dial, 3 Tumblers, operating in a manner more simple than an ordinary safe lock, and affording about the same degree of security. These Locks are easily fitted and operated. They are reliable, and at moderate prices, with liberal trade discounts. We began their manufacture timidly in 1864, but the reception has been unexpectedly flattering. We now offer with entire confidence the most complete line of Combination Locks for Cabinet work extant.

MILLER LOCK CO., Philadelphia, Pa.

and other small work, was transported by teams from the foundry to Chatham, N. Y., about 50 miles. The shape of the Lakeville furnace, as shown by the engraving, is much nearer modern practice than some of the charcoal furnaces built a century later, and probably much better results than were obtained would have been secured had the state of mechanical knowledge then been such as to have secured a blast of sufficient volume and intensity. As to what the original blast mechanism was we have no information, but the accompanying illustration will indicate the form of blowing apparatus in use at this furnace in 1776. Its construction will be readily understood from the engravings, which represent side and end elevations. A A were old-fashioned leather bellows, there being two of them, driven by a water-wheel, B B, the shaft of which was provided with tappets, C C, which engaged with a lug, D, attached to a lever, D F F, by which the bellows were operated.

Without prejudice to other districts, we can say that no particular brand of pig iron is held in greater esteem for car-wheels, or commands a higher price, than that known as "Salisbury iron." In fact, the name has become a synonym of superiority among chiling irons, and we are convinced that the merit does not lie in the ore only, but it is in large part due to the uniformity of product secured by regular mixtures and furnace operation.

For the present we shall confine this article to the character of ores used. At present there are eight furnaces which it is claimed are the only ones making iron from the genuine Salisbury ores. These are located as follows: Three at East Canaan, one at Lime Rock, one at Sharon Valley, one at Cornwall Bridge and one at Huntsville, in Connecticut, and one at Millerton, in New York State. The other furnaces, which are located in New York, Connecticut and Massachusetts, depend also on brown hematite ores. We shall not specify furnaces, nor treat of the charcoal supply or operation, preferring to take this subject up specially. With the exception of some carbonate ores, all are "brown hematites." The following are analyses of the Salisbury ores, made by Prof. C. F. Chandler, of New York, in June, 1875:

Davis Ore.	Percent.
Sesquioxide of iron	75.730
Sesquioxide of manganese	1.576
Silica	7.340
Sulphur	0.082
Phosphoric acid	0.032
Lime, magnesia, alumina, water, &c.	15.210
Equivalent to:	
Metallic iron	53.000
Metallic manganese	0.958
Sulphur	0.082
Phosphorus	0.014
Chaffield Ore.	
Sesquioxide of iron	78.136
Sesquioxide of manganese	0.826
Silica	6.640
Sulphur	0.049
Phosphoric acid	0.501
Lime, magnesia, alumina, water, &c.	13.857
Equivalent to:	
Metallic iron	54.606
Metallic manganese	0.576
Sulphur	0.048
Phosphorus	0.219
"Old Hill" Ore.	
Sesquioxide of iron	73.51
Sesquioxide of manganese	0.96
Silica	10.48
Sulphur	0.07
Phosphoric acid	0.57
Lime, magnesia, alumina, water, &c.	14.41
Equivalent to:	
Metallic iron	51.45
Metallic manganese	0.67
Sulphur	0.07
Phosphorus	0.25

Before being smelted the ore is broken up by crushers, and is then washed in a double "ore-washer," consisting of two revolving drums—one made of cast-iron plates perforated with holes, and the other with long, narrow slits. The ore, as it comes from the mine or crusher, is fed into a trough, a stream of water carrying it down into the first drum. The agitation produced by the revolution of the drum or "sorter" causes the water to wash off the clay, &c., from the ore, and the smaller lumps pass through the holes in the first sorter, and are carried down another trough to the second drum, where the larger pieces escape at the delivery head and are carried thence up to a crusher, where they are again broken up and passed down the trough through the first drum.

The character of pig iron produced from these ores is shown by the analysis and by the physical tests made by Professor Thurston, as follows:

Analysis of No. 4 Salisbury Iron.			
Silicon	0.000	Phosphorus	0.004
Sulphur	0.008	Graphite carbon	3.073
Manganese	0.490	Combined carbon	4.72

PHYSICAL TESTS.					
Grade of pig iron.	Specific gravity.	Strength of Salisbury pig iron.			
		Tension.	Compression.	Torsion.	Transverse.
		Pounds per sq. in.	Pounds per sq. in.	Foot-pounds.	Pounds.
A—Salisbury iron No. 2	7.186	12,000	47,555	305.93	820
B—Salisbury iron No. 4	7.259	7,333	56,022	461.98	600
		Ultimate.			
A—Salisbury iron No. 2	7.186	30,500	87,429	579.38	1,383
B—Salisbury iron No. 4	7.259	34,407	127,323	539.93	2,060

Four Salisbury iron bars, 2 inches by 1 inch, cast by the Barnum-Richardson Company, gave the following results when broken upon supports placed 3 feet apart:

Breaking stress in cwt.	Ultimate deflection in inches.	Permanent set in inches.
36.31	.623	Not recorded.
32.34	.671	Not recorded.
37.50	.670	.25
36.00	.720	.31
Average—35.53	.656	.28

New Gun Works in Italy.—The rumor circulated some time ago that Sir William Armstrong and his business associates were about to establish a factory in Italy proves to have been well founded. They have

obtained a valuable concession from the Italian Government, and purpose to establish large gun and armor-plate foundries at the entrance to the Bay of Pozzuoli. Contracts have been signed ceding to them 250,000 sq. m. of ground—not far from 60 acres.

## The Late Delaplaine McDaniel.

The death of Delaplaine McDaniel, of the McDaniel & Harvey Iron Company, which we briefly noticed at the time, calls up a number of reminiscences and anecdotes. Mr. McDaniel was the first to successfully produce American sheet iron, and the efforts made by him to secure its use by the mechanics of the day, who were prejudiced in favor of the imported article, and accordingly against the domestic article, would form a very interesting chapter in the history of American manufactures. One of the first lots of 100 bundles of iron which he made was shipped to this city, consigned to Bruce & Cook. These merchants undertook, with Mr. McDaniel, the task of persuading American mechanics to give it a fair test. The iron was offered with the guarantee that it would work satisfactorily, and that if it did not it might be returned with a bill for the loss sustained in attempting to use it. Notwithstanding these very liberal conditions, sheet-iron workers were very loth to give the new iron a trial, and were free to assert that it was of no account.

A prominent sheet-iron worker, whose shop was in Fulton street, if we mistake not, was persuaded to try a bundle of this iron upon the conditions named. The iron was sent to his place, but a short time after it was returned with evidences that it had broken in working, accompanied by the bill for damages, according to contract. The test in those days of the quality of sheet iron was working it into coal hods. The strain upon the iron incident to the seams and peculiar shapes of coal-hods was the measure of its quality. The attempt had been made in this case to construct a coal-hod, but, as the iron had broken in the test, it was returned. This was accompanied by many evidences of ill nature upon the part of the purchaser. Feeling satisfied that the iron had not been fairly tried, Mr. Cook, who relates this story, sent the iron back to the shop from which it had been returned, and went himself to investigate the method by which it had been tested. After some conversation with the irate tinsmith, and after agreeing to pay for the workman's time if the iron was not proven good, he succeeded in getting a second sheet of iron tested under his own supervision. He soon discovered that his suspicion that the test in the first case had not been a fair one was entirely correct. The workman, true to his prejudice, had purposely misused the iron in the machines so as to crack it. Under the joint efforts of the proprietor, who began to see that the iron was really good, and Mr. Cook, including threats from the former that he would discharge the workman if the iron was not fairly treated, a coal-hod was finally produced that showed unmistakable evidence that the iron was even better than any imported article that was in the market. The workman was convinced against his will, and still said that he would have nothing to do with the iron under any consideration, on account of the smudge coming from it. This occurrence, of course, was long before the invention of the Harvey cleaning process, which has since made the same iron famous. The fine charcoal which is sifted between the sheets in the process of rolling adhered to the iron, and it was certainly a disagreeable job to work it as compared with the clean iron that was being imported. Merit, however, prevailed, and ere long the imported article was driven from the market. Various other stories are told illustrating the struggle through which Mr. McDaniel and other pioneer manufacturers of his day passed in introducing American-made material in competition with imported goods.

## Decision as to a Contract for the Delivery of Steel.

The case of the Merchants' and Manufacturers' National Bank vs. Spratt, Johnston & Co., garnishees of the Siemens-Anderson Steel Company, decided recently in the Pennsylvania Supreme Court, involved a nice question of law as to the liability of a party to a contract to deliver iron according to the future specifications of the other party. The firm of Johnston & Co., of Pittsburgh, had asked the steel company to furnish them 300 tons of pig steel before March 30, 1882. The prices were named in the communication, and it was provided that the quantity of goods to be delivered by installments, the time of delivery and the classes of goods required should be named at the times when the goods were wanted. Part of the goods had been delivered when the company failed, and the bank, one of the creditors, attached the money due for steel delivered in the hands of Spratt, Johnston & Co., as garnishees. They admitted their liability for the goods already delivered, but claimed the right to set off against the sum due the damage which they had suffered because of the advance steel and the non-delivery of the goods for which they had as yet sent no specification. The Court of Common Pleas No. 1, of Allegheny County, held the set-off good, but Justice Clark, of the Supreme Court, holds, reversing the court below, that there was no obligation to deliver the steel until the specifications were furnished by Spratt, Johnston & Co., and that, therefore, there was no default and no damage accruing from the non-delivery. The claim set off, therefore, could not be lawfully allowed.

A railway carriage of unique construction has been built for the South-Eastern Railway Company, England. The most noticeable feature of the carriage consists in its electro-plated steel paneling and electro-plated copper moldings. The electro-plating has been tried in order to avoid the expense and also the time occupied in repainting, which, owing to the numerous tunnels on the line, has proved to be a large item in the expenditure. The carriage throughout is of first-class workmanship and finish, and the exterior of the body, with its bright surface of electro plate, is said to present a remarkably handsome appearance.

# TRAVELING JIB AND PILLAR CRANES.

Weston's Patents. Any Capacity.

CAN BE OPERATED BY HAND OR POWER.  
ARE ABSOLUTELY SAFE FOR OPERATOR AND LOAD.

Simple, Durable, Convenient and Economical.

USED BY THE BEST SHOPS AND FOUNDRIES. PLANS AND ESTIMATES ON APPLICATION.

## YALE & TOWNE MFG. CO.,

Manufacturers, Engineers and Machinists,

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NEW YORK, 62 Reade Street,  
BOSTON, 224 Franklin Street.

CHICAGO, 64 Lake Street.  
PHILADELPHIA 15 N. Sixth Street.

CATALOGUES ON APPLICATION.



# H. D. SMITH & CO.,

Plantville, Conn.,

MANUFACTURERS OF THE

## BEST QUALITY CARRIAGE MAKERS' HARDWARE,

Manufacture the Largest Variety of Forged Carriage Irons, of Best Material and Workmanship.

PRICES LOW FOR QUALITY OF WORK FURNISHED.

SEND FOR PRICE LIST.

**STEEL RAILS,**  
T AND STREET.  
OPEN HEARTH AND BESSEMER STEEL  
**BLOOMS, SLABS AND BILLETS,**  
Rolled and Hammered.  
**HOMOGENEOUS STEEL BLOOMS,**  
FOR BOILER PLATE.  
**BLOOMS AND BILLETS,**  
For Nails, Wire, and Bridge Bars.  
**MACHINERY STEEL,**  
Rounds, Squares and Flats.  
**SPRING STEEL,**  
Flat or Concave.

### Pennsylvania Steel Company.

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S. M. FELTON, President, 208 South 4th Street, Philadelphia, Pa.  
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FREDERICK W. WOOD, Superintendent, Steelton, Dauphin Co., Pa.  
STEPHEN W. BALDWIN, Agent, 160 Broadway, New York.

**STEEL FORGINGS,**  
Heavy and Light.  
**STEEL CAR AND MINE CAR AXLES.**  
**RAIL FASTENINGS, SPIKES, &c.**  
INTERLOCKING  
**SWITCHES AND SIGNALS,**  
CROSSINGS, FROGS, SWITCHES,  
SWITCH STANDS,  
OF ANY REQUIRED PATTERNS.  
**STEEL SHAFTING,**  
Hammered and Rolled.  
CORRESPONDENCE SOLICITED.

### Norwich Bolt Works,

William C. Lanman,  
NORWICH, CONN.

Carriage Bolts, Whiffletree, and Fancy Head Bolts, Hand-Forged from Genuine Norway Iron. None in Market finer in quality or in finish. Prices as low as for Inferior Work.

ARNOLD MELLERT, Chairman.

P. D. WANNER, Secretary and Treasurer.

MELLERT FOUNDRY & MACHINE CO., Limited.

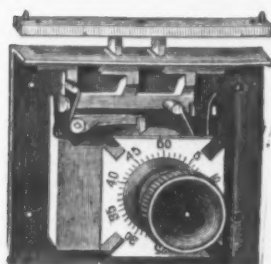
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**MANUFACTURERS OF**  
**WATER & GAS PIPES**  
12' 4"  
SPECIAL CASTINGS, such as Branch Pipe, Bends, Reducers, Sleeves, Curves, &c. STOP VALVES for Water and Gas from 2 to 48 inches in diameter. FIRE HYDRANTS, RETORTS, and LAMP POSTS. FLANGE PIPE of all sizes in use. General Machinery and Castings. Car and Railroad Castings. The Improved Canada Turbine Water Wheel. Structural Work (Ornaments and Plain).  
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MANUFACTURERS OF

### WIRE NAILS

Of Every Quality and Description.

Taunton, Mass., and 78 Chambers  
Street, New York.



### TAYLOR'S DUPLEX COMBINATION LOCKS.

The Cheapest and Best in the World. Send for Prices.  
RETAIL FROM \$1.50 TO \$3.00. 2500 CHANGES.

FOR ALL PURPOSES.  
TAYLOR MFG. CO.,  
NEW BRITAIN, CONN.

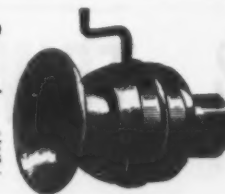
See full-page advertisement in this issue of  
The Iron Age, on page 20.

SAMUEL A. HAINES,  
88 Chambers St., New York.



### W. R. OSTRANDER & CO.,

21 & 23 ANN STREET, NEW YORK,  
Manufacturers of  
SPEAKING TUBES, WHISTLES, ELBOWS, ORAL ANNUN-  
CIATORS, BELL & ELECTRIC WIRE TUBING.  
Complete outfits of Speaking Tubes, Whistles,  
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on application. Factory, DeKalb Ave., near Knick-  
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MANUFACTURERS OF

Horse, Mule & Snow Shoes of the Perkins Pattern.

Works at Valley Falls, R. I. Office, 31 Exchange Place, Providence, R. I.  
W. CARPENTER, President. C. H. PERKINS, Gen'l Manager. R. W. COMSTOCK, Secretary.

### The Curtis Steam Trap.



Has automatic air discharge; has a differential op-  
ing, thus discharging all the water as fast as it comes,  
is very accessible for cleaning, the valve being on the  
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7th St., Phila., Pa.; 186 and 283 Market St., Chicago,  
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Pittsburgh, Pa.; 745 Craig St., Montreal, 707 Mar-  
ket St., St. Louis.

### THE BABCOCK & WILCOX CO.

WATER TUBE STEAM BOILERS.

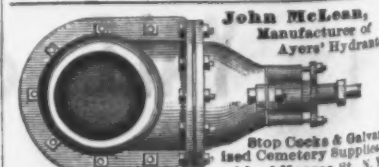
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BOSTON, 50 Oliver Street.  
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Send to nearest office for circular.

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Plymouth, Mass.,

Manufacturers of Copper, Brass and Iron Rivets,  
Common and Swedes Iron, Leathered, Carpet, Lace  
and Gimp Tacks; Finishing, Hungarian, Trunk,  
Clout and Cigar Box Nails, &c. Rivets made to  
order.

NEW YORK AGENCY,  
**GRUNDY & DISOSWAY**  
HARDWARE,  
165 GREENWICH STREET,  
Agents for the Philadelphia Star Carriage and Tire Bells.

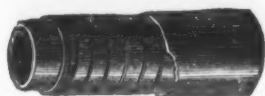


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Manufacture of  
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Stop Cocks & Galvan-  
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295 & 296 Monroe St., N. Y.  
**COLD ROLLED**  
STEEL AND IRON  
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**WOOD WATER PIPE**

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ESTABLISHED 1839.

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Manufacturers of  
Carpenters', Carpenters', Stone Cutters',  
Tin, Copper and Boiler Makers'**MALLETS,**Hawking Beets, Hawking and Chalking Irons;  
also all kinds of Handles, Sledge, Chisel and Hammer  
Hand-axes, AlsoCOTTON AND BALE HOOKS.  
Patented Feb. 18, 1877; a new combination of Hooks.  
450 E. Houston St. New York City.

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CHAMBERS ST.  
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F. R. EMMONS & BRO.  
**TACKS**  
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Lock and support upper and lower  
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Largest makers of Fine Crucible Steel Goods in the country.  
STEEL PENS with style and action suited to every hand.  
All assortments of Pens mailed on receipt of 25 cents.  
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Sold by all dealers. Price Lists furnished on application.  
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CANTON, OHIO,  
MANUFACTURERS OF BEST REFINED

**Tool Steel**  
And Other Fine Grades of  
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PAT. DEC. 5, 1882.  
PAT. DEC. 4, 1883.  
**ACME MACHINERY COMPANY,**  
Manufacturers of  
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**PHOSPHOR TIN.**  
By using my Phosphor Tin, manufacturers can  
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themselves, by the simple process of melt-  
ing, much cheaper than they are now to be had  
in the market. New or old copper can be used.  
For circulars and prices address  
**FRED. NAUMANN,**  
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**KEYSTONE SCREW CO.,**  
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**RUBBER BELTING and PACKING.**Machine Belting,  
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Piston Rod Packing,  
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Wagon Springs,  
Gas Tubing,  
Machine Belting,  
Billiard Cushions,  
Emery Wheels.This company manufactured the immense DRIVING and ELEVATOR BELTS for the Buckingham  
Elevators at Chicago, which have been running perfectly for more than Twelve Years; also those for  
Armour, Dole & Co. of Chicago; Vanderbilt's Elevators for the N. Y. Central & Hudson River R. R.; the  
great Elevators of the Penna. and Erie Railroads, of Jersey City and Hoboken; Dow's Stores, of Brooklyn,  
and many others—in fact, the largest Belts for the largest Elevators in the world.  
A single carrier belt in the Penna. R. R. Elevator is over 2000 feet long, weighing 18,000 pounds, and  
has run perfectly from the start.**LINEN and COTTON HOSE.**

Pat. 6545.



Plain and Rubber Lined.

Circular Woven Seamless Antiseptic RUBBER  
LINED "CABLE" HOSE and "TEST"  
HOSE, Vulcanized Para Rubber and Carbolized Duck,  
for the use of Steam and Hand Fire Engines, Force  
Pumps, Mills, Factories, Steamers, Ships, Hospitals, &c.

Pat. July, 1873.



"TEST" HOSE.

"CABLE" ANTISEPTIC.

**Emery Wheels and Packing.**ORIGINAL  
Solid Vulcanite  
**EMERY WHEELS**  
LARGE WHEELS MADE ON CAST-IRON CENTER IF DESIRED.The properties of these Wheels are such that they can be used with great advantage and economy  
for cutting, grinding and finishing Wrought and Cast Iron, Chilled Iron, Hardened Steel, Slate, Marble,  
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Machinery of almost every description.  
Pat. Jan. 19, 1880.**PATENT ELASTIC****Rubber Back Square Packing**

BEST IN THE WORLD

For Packing the Piston Rods &amp; Valve Stems of Steam Engines &amp; Pumps.

It represents that part of the packing which, when in use, is in contact with the piston rod.  
A elastic back, which keeps the part B against the rod with sufficient pressure to be steam-tight  
and yet creates but little friction.  
This Packing is made in lengths of about 20 feet, and of all sizes from 1/4 to 2 inches square.**Corrugated Rubber Mats and Matting.**

Pat. 11,508, 215,601.

For Halls, Flooring, Stone and

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Iron Stairways, &c.  
This practical and indispensable article—  
especially for wear where exposed to  
ice, snow or slush—was first intro-  
duced by this company several years  
ago, and its real value is in being  
almost indestructible, when  
proper materials are used in  
its manufacture, whilst the cheap,  
inferior quality forced on the public by reckless imitators of our patent goods soon becomes brittle  
and crumbles to pieces. Address

**NEW YORK BELTING & PACKING CO.,**  
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The most complete assortment in the U. S. of  
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**PLANE IRONS.**  
CAUTION.—Buyers should be on their guard and not have inferior goods palmed on them by un-  
principled persons, who represent them as our make. Our tools are stamped "BUCK BROTHERS,"  
and our labels have on our trade-mark also "Riverlin Works."

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—FOR—  
BEARINGS, SLIDE VALVES, CYLINDER RINGS, CROSS-  
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And all purposes where Maximum Durability, Anti-Frictional  
and Non-Cutting Qualities are Desirable.

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BOLTS & NUTS,  
MACHINE and WOOD  
SCREWS, &c., &c.**  
Combine Toughness, Strength, Durability and  
Resistance to Corrosion.

**"Phosphor-Bronze."**  
CASTINGS OF ALL KINDS TO ORDER.  
SEND FOR PAMPHLET AND PRICES.

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Owners of the U. S. Phosphor-Bronze Patents. Sole Manufacturers of Phosphor-Bronze in the U. S.

**DROP FORGED.**  
**MERRILL BROS., 26 First St., Brooklyn, E. D., N. Y.**

**Commercial Relations with Mexico.**

Appropos of the discussion of the Mexican  
reciprocity treaty, which now seems to be  
without hope of the necessary recognition by  
the House of Representatives, a Washington  
correspondent indulges in the following sug-  
gestions of the manner in which some of its  
advantages could be acquired without legisla-  
tion:

In Mr. Nimmo's just-published report upon  
the internal commerce of the United States  
appears some very valuable information upon  
the subject of our relations with Canada and  
Mexico, from which it would seem that a  
treaty could be negotiated with Mexico not  
affecting the customs duties of either coun-  
try, and therefore not requiring any legisla-  
tion by Congress, which would establish just  
as intimate commercial relations with Mex-  
ico as we now have with Canada, and which  
incidentally would develop direct commerce  
between Canada and Mexico over the railroad  
systems of the United States. All of the  
States of the Republic of Mexico have agreed  
to an amendment of the constitution of the  
Republic abolishing all interior custom houses  
and customs duties upon inter-State com-  
merce. This amendment takes effect, accord-  
ing to act of the Mexican Congress and the  
proclamation of the President of the Republic,  
by December 1, 1884, at the latest. This will  
establish the internal commerce of Mexico  
upon the same basis as that of the United  
States and of the Dominion of Canada, viz.,  
absolute free trade among the several States  
and Territories embraced under the several  
Governments. Already, as a sequence to rail-  
way communication, the internal through  
bonded system has been introduced into  
Mexico, and merchandise can be transported  
in bonded cars from the Mexican boundary  
to certain inland ports of entry. Instead of  
waiting for the tardy action of the House of  
Representatives upon a bill to carry into  
effect the reciprocity treaty with Mexico,  
which action may be indefinitely postponed,  
it may perhaps occur to the eminently prac-  
tical mind of President Cleveland that very  
important, even if not equal, advantages  
may be obtained by negotiating with Mexico  
a treaty similar to that of May 8, 1871, with  
Great Britain in regard to the United States  
and Canadian transit trade.

No legislation is needed to carry into effect  
such a treaty as the law of July 28, 1866,  
Section 30,005 of the Revised Statutes author-  
izes the conveyance over the territory of the  
United States of merchandise from foreign  
countries for Mexico without the payment  
of duties. If such a treaty were negotiated  
with Mexico, so that cars of United States  
railroads could pass with their contents un-  
impeded over the railroads of Mexico, and  
those of the latter country could pass freely  
over our railroads, just as the cars of the  
United States and of Canadian railroads are  
now passing, very many of the essentials of  
a true reciprocity would be established over  
the whole of the North American continent.  
If this should ultimately lead to absolute  
free trade between Canada, Mexico and the  
United States, it would be because of a con-  
viction upon the part of a majority of the  
people of the three countries that it was to  
their mutual interest. It is not probable  
that the day is near when this will be accom-  
plished. It would seem, however, that the  
establishment with Mexico of such a recip-  
rocity of transportation facilities as we now  
have with Canada is perfectly practicable,  
entirely consonant with the collection of the  
customs revenues of both countries, as expe-  
rience has shown it to be in our intercourse  
with Canada, and is therefore open to none  
of the objections urged against the pending  
reciprocity treaty.

**NEW PUBLICATIONS.**

**THE ASSAY AND ANALYSIS OF IRON AND STEEL, IRON  
ORES AND FUEL.** By Thomas Bayley. Size, 7 1/2  
x 5 inches, 91 pages. Published by E. & F. N.  
Spon. Price, 40 cents.

This book, by the author of the "Pocket  
Book for Chemists," is based upon a series of  
articles intended for practical men, which  
originally appeared in the *Mechanical World*.  
Throughout the book the subject matter is  
divided into two parts, as indicated by the  
different kinds of type used. The portion  
printed in the larger type, which comprises  
by far the greater part of the book, are  
methods concerning which Mr. Bayley writes  
from personal experience, while the remain-  
ing notes in smaller type describe methods  
of recent publication, but which have not  
been practically tested by the author. The  
first eight chapters of the book, covering 40  
pages, contain instructions for analyzing iron  
and steel for the quantitative determination  
of the elements ordinarily present, the list of  
methods comprising tests for manganese,  
phosphorus, silicon, sulphur, tungsten, car-  
bon—graphitic and combined—chromium,  
titanium, nitrogen, oxygen and slag. Next  
are given instructions for analyzing iron ores  
and slags, followed by methods for deter-  
mining the chemical composition of coals  
and cokes and also their heating power, the  
book ending with a chapter on the analysis  
of gaseous fuel, blast furnace gases, &c. While  
the book presupposes some knowledge  
of chemistry, any one at all familiar with  
the manipulation of chemical apparatus will  
experience no difficulty in following the  
directions to the successful analysis of iron  
and steel. The book is of value as present-  
ing in a compact form such methods of  
chemical analysis as are necessary to a  
determination of the more important ele-  
ments entering into the composition of iron  
and its ores and the fuel used in their  
working.

**ENERGY AND MOTION.** By William Paice, M. A.  
Size, 7 x 4 1/2 inches, 114 pages. Published by  
Cassell & Co. Price, 75 cents.

This book is intended as an elementary  
work on the first principles of motion, force  
and energy, and is arranged as a text-book  
of elementary mechanics. As an elementary  
scientific text-book it has the advantage of  
necessitating in the student only the most  
primary algebraical knowledge for its thor-  
ough comprehension. An excellent feature  
about it is the proportionately large amount  
of space that is devoted to problems, the  
solution of which involve the practical ap-  
plication of the principles explained. While  
there are some features in the author's gen-  
eral treatment of the subject, as indicated  
above, which are excellent, there are many

peculiarities in the details of the work that  
call for adverse criticism. In the second  
part of this little volume, entitled "Ki-  
netics," we notice the word "poundal" de-  
fined as the British absolute limit of force,  
which seems to be an unnecessary addition  
to an already too extensive table of units.  
Mr. Paice's definition of mass, and the com-  
pound term, mass-pound, also, is not such as  
to give a very clear idea of them to the  
reader, since he helps to define them by the  
aid of the words "stuff," "something," &c.,  
which, when used for such a purpose, are  
not only meaningless to an educated, but we  
think equally so to an uneducated, mind.  
Later on we find horse-power defined as  
being equal to 550 foot-pounds, which omits  
the most important factor of time, and,  
therefore, as a definition, is an absurdity.  
If Mr. Paice had not endeavored to make  
his book so severely simple, and had defined  
his terms in a little more scientific manner,  
we think it would have proved of more  
value as an elementary text-book.

**New York Shipbuilding Reminiscences.**

As one wanders along the North and East  
rivers and about Greenpoint, his mind is  
recalled to shipbuilding days by seeing some  
few old hulks hauled up ashore or some faded  
sign. The first steam engines of America  
were built, it is said, by Robert McQueen.  
The marine-engine works were developed  
from Fulton's experiment to put steam into  
vessels in 1807. Fulton brought out from  
England his engines and boilers, and he then  
erected a shop at Jersey City, since covered  
by the Secor Iron Foundry, and there a num-  
ber of monitors were built during the  
Rebellion. Fulton continued to build engines  
as long as he lived, getting his iron castings  
from McQueen and his brass castings from  
Allaire, of New York. When Fulton died,  
in 1815, Mr. Allaire took his shops, and it  
required nearly a year for him to build the  
boilers and engine of the Chancellor Liv-  
ingston, which old vessel, I think, is still  
used in our waters, perhaps under the name  
of the Chancellor. In 1816 Allaire estab-  
lished himself in New York. There he built  
the big North River steamboats and tested  
anthracite coal, which had been supposed  
worthless to make steam. Down to a very  
late period wood was the fuel to run steam-  
boats on the North River.

Allaire passed out of active business in  
1850, and T. F. Secor took his place. The  
Novelty Iron Works were established by the  
Rev. Eliphalet Nott, president of Union Col-  
lege, who brought anthracite coal into gen-  
eral use for houses and for steam-power.  
He built a boat called the Novelty, with new  
ideas in it, and bought a yard on the East  
River to construct in. In course of time his  
shops took the name of the Novelty Works,  
and passed under a variety of partners. In  
1855 the Novelty Iron Works were incor-  
porated with \$300,000 capital. They still  
stand on the East River at Twelfth street.  
The Delamater Iron Works, on the North  
River, were founded in 1850; there the ship  
Ericsson was built, and during the war the  
original Monitor had her machinery made  
there. Delamater for a long time was in  
absolute control of these works.

The Morgan Iron Works, at the foot of  
Ninth street, East River, began in 1838.  
Here were built remarkable river and ocean  
steamers, and Mr. Quintard in 1850 became  
absolute proprietor. The Continental Works,  
at Greenpoint, made the big tube, 7 1/2 feet  
in diameter, which crosses on High Bridge  
at the Harlem River. From this yard was  
launched the original Monitor on the 30th of  
January, 1862, which in less than six weeks  
revolutionized naval warfare at Fortress  
Monroe. John Roach bought the Etna Iron  
Works in 1852, which had been previously a  
plain, obscure establishment. Roach only  
had \$200 when he started in, and at present  
he is the chief shipbuilder of the New World.  
Mr. Roach was brought up in engine shops,  
and he soon started by himself and put up  
the largest engine shops in the country. In  
course of time he moved to the Delaware  
River his principal establishment, in order  
to get the benefit of cheap metal and fuel.

William H. Webb, whose shipping yard  
was the most celebrated of its day, was the  
son of a shipbuilder who made war vessels  
for the Government in 1812. Young Webb,  
at 15, left Columbia College to become an  
apprentice in his father's shipyard, where he  
worked six years with but a single week of  
vacation. In 1840 he took his father's yard,  
and in the course of 25 years built more ton-  
nage than any individual builder in America.  
There, in 1858, was launched the big Rus-  
sian frigate called the General Admiral.  
Two big ships were built by Webb for the  
Italian Government. All the New York  
shipyards turned out war vessels for our  
Government.

Westervelt's shipyard, at the foot of  
Cherry street, originated with a sailor boy  
who came from the vicinity of Jersey City,  
and having gone to sea numerous times  
peeped into the shipyards wherever he hap-  
pened to be, and then became an apprentice  
in one of them, and his first vessels were  
built at Charleston by negro slaves. He  
went into business with Mr. Bergh, prob-  
ably the father of Henry Bergh. Among  
the notable ships he built were the pioneer  
ocean steamers to Havre and the best  
Havana steamers. Henry Steers, of Green-  
point, was born in 1832 of a shipbuilding  
family; George Steers, the yacht builder,  
was his uncle. The New York Free Academy  
educated the shipbuilder. John Englis, at  
the foot of Tenth street, East River, who  
has built most of the Sound steamers, began  
his experience on Lake Erie in 1837, and  
then came back here and built 56 steamers  
in all, with an aggregate tonnage of 84,000.  
He built the Plymouth Rock in 1853. The  
St. John and the Dean Richmond and the  
Fall River Boats were built by Englis. The  
Cornells, who have great iron works in Cen-  
ter street, began in 1847 with brother ap-  
prentices. Their factory, erected in 1850,  
was in Twenty-sixth street, at Tenth avenue.  
This firm has done wonders in making iron  
fronts for houses. About 1850 it was hard to  
find any iron building in America which had  
\$10,000 worth of iron in it; now it is com-  
mon to see them with half a million of iron-  
work. The Cornells have patents running  
back to 1854. They built the New York  
Stock Exchange and the Mutual Life's old  
building in Broadway.



## BUFFALO PORTABLE FORGES AND HAND BLOWERS.



Warranted Superior to any other make, and  
Guaranteed to give Perfect  
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FISKDALE, MASS.  
IMPROVED



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AND  
SHIP AUGER BITS.

Superior to any ever before made. Every  
Auger and Bit Warranted.

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Russell Jennings' Pattern Auger Bits, Kentucky Post  
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## Cast Steel Auger Bits.

Medals and First Premium Awards of Massachusetts, 1841,  
1848, 1850. Centennial Exhibitions, Philadelphia,  
1876. International Exhibitions, Paris, 1878.

The Snell Car Bits are used by all the large Car Manufacturers  
of the United States. They are superior to all others in quality,  
and enjoy the highest reputation.

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BRONZE MEDALS  
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Convex and Concave  
Cutting Edges.



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THRUST CUT ON THE CONVEX EDGE.

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A Fair Trial will Demonstrate that this is the best DOUBLE-EDGED SAW for Trees or Vines.

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NAILS and Bar Iron of Superior Finish, made exclusively from Pig Iron.

## Crawford's Patent Adjustable Screw Holder and Driver

COMBINED.



Price, per doz. 4-in., \$6.00; 6-in.,  
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SEND FOR CIRCULAR AND DISCOUNTS.

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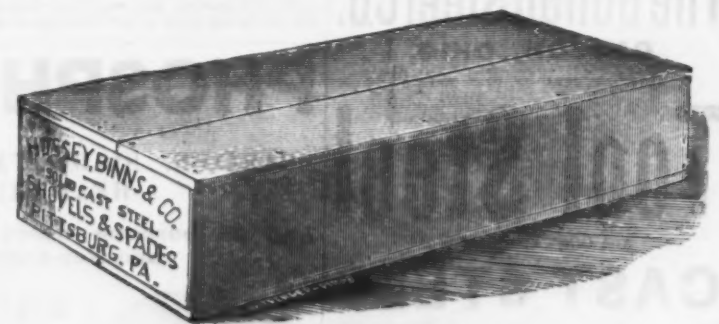
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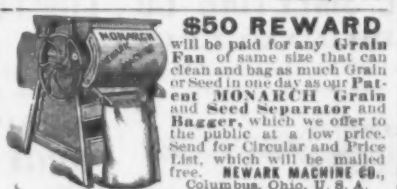
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list and sample spout to Chas. Miller & Son,  
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will be paid for any Grain  
Fan of same size that can  
clean and bag as much grain  
or seed in one day as our Pat-  
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Send for Circular and Price  
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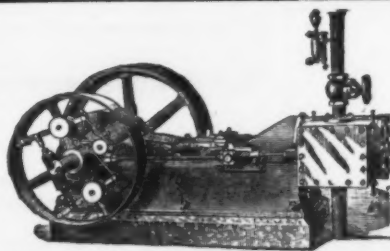
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DEAR SIRS: The 12" x 12" Horizontal Engine which you sent us nearly one year ago has been in continual night service ever since, with the exception of a few nights each month. We find it drives three No. 7 Brush Arc Dynamos with steadiness and economy, and so far has required little or no repairs. It is belted direct to the dynamo and makes about 240 revolutions per minute with 10 lbs. steam pressure at the boiler, developing about 65 H.P. The Dynamos supply current for 120 Brush Arc Lamps of 1200 candle-power, and turnish satisfactory Street Lights for this city.

Yours very truly,  
(Signed) BRUSH-SWAN ELECTRIC LIGHT CO.,  
WM. W. CHAMBERLAIN, Pres't.



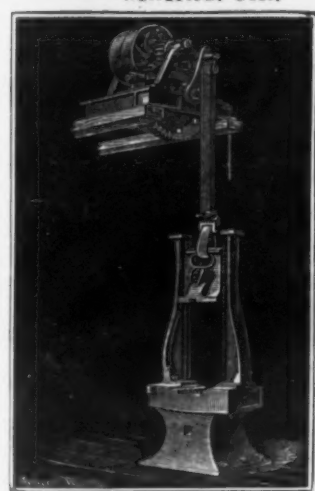
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OFFICE OF THE NEW YORK STEAM CO.,  
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N. Y. Safety Steam Power Co., 30 Cortlandt St.,  
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CHAS. E. EMERY, Eng'r and Supt.

NEW YORK SAFETY STEAM POWER CO., E. T. COPELAND, General Agt., 30 Cortlandt St., New York City.  
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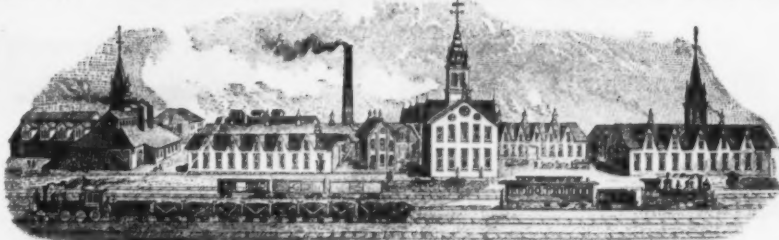
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### The Labor Situation West.

The labor situation in the Western rolling mills is growing quite interesting, as well as complicated. We have already referred to the demand of the manufacturers for a reduction in the price of puddling to \$4 and a corresponding reduction in the other parts of the scale. In some directions this action has been regarded as somewhat "previous," as under the terms of the agreement no change in the scale can take place until June. But the justification of this action is found in the fact that the Amalgamated Association always begins quite early to discuss in its lodges the changes, if any, that shall be made in June. Under the rules of the Amalgamated Association all changes found necessary in the scale of prices governing any department of the mill must be submitted in writing by such department to the several subordinate lodges on or before the first meeting in the month of February, at which meeting the lodges shall consider the desired change and vote thereon, and report the result to the general office of the Amalgamated Association. In other words, it is in the month of January that the individual members of the Amalgamated Association discuss what reductions, if any, in the scale they will concede, and what changes are necessary, and therefore it is not "previous" for the manufacturers to intimate in January what changes they want. Most, if not all, of the lodges took action on this subject last Saturday night.

In addition to the action of the Manufacturers' Association, certain events have recently transpired which will have an important bearing on the wages question in the Western mills. Without reference to their chronological occurrence, the first is the recent advance in nails. While this advance was not sufficient, if, indeed, in many cases it was enough to bring the selling price of nails up to actual cost, it appears to have been accepted by the workmen as an indication that the state of trade was not as poor as has been represented. It is very natural for employees, when a reduction of wages is suggested, to believe that the depression of trade which it is claimed makes such reduction necessary is not so poor as has been represented. This advance in price, therefore, will no doubt be accepted at once by the majority of workmen as an indication that, in spite of the representations of the manufacturers and their desire to keep prices down until the wages question has been settled, the selling price of product will advance, and in this belief they will be strengthened by the second advance of 5 cents made at Wheeling, though in this case, also, the probabilities are that the cause of the advance is not to be found in the strength of the demand, but in other circumstances, to which we refer elsewhere. Coming, as this advance has, about the time when the Amalgamated Association lodges are discussing the question of wages for next year, we think it will be found that in this respect, at least, it was ill timed, and will have a tendency to prevent concessions in wages.

A second event of considerable importance is the action of the mills at Youngstown. As reported in the journals of this city, the resolution was introduced and adopted to the effect that, owing to low prices and the large wages demanded by skilled labor, it was advisable to close down all the rolling mills through the valley and Cleveland, commencing the middle of February and remain shut down until after June 1. If the action indicated in the resolution is carried out it will do more to convince not only the ironworkers, but the country at large, of the unprofitableness of the iron trade than any mere assertions can accomplish. Indeed, it seems impossible to make the ironworkers believe that there is any necessity for manufacturers seeking reduced cost of product, and therefore that they are called upon to do their part in securing such reduced cost. But that such a necessity does exist no one who recalls the failures and extensions of Eastern Ohio and Western Pennsylvania rolling mill proprietors within the past two or three years can have any doubt. Two of the largest rolling-mill firms in Pittsburgh, operating six of the mills in that vicinity, are either working under extension or are seeking one. Two of the largest rolling mills in the Shenango Valley are in the same condition. The largest mill in the Mahoning Valley is in the hands of a receiver, and a second is working also under an extension. If these financial difficulties were confined to one locality it might be asserted that it was owing to some disadvantage under which that locality labored that did not pertain to other sections. But from Pittsburgh to Cleveland, through the greatest merchant-iron producing centers in the country, this condition of things exists, and there can be no doubt that a large part of it is caused by the much greater labor cost of the iron produced in the mills of that section than of that at the mills with the products of which it comes in competition.

All these things indicate that the discussions in connection with the labor question this year in the West will be among the most important that have ever taken place in that section, and will involve the more serious consideration of subjects and relations that in the past have only been incidentally touched upon. The time has come when if the eastern part of what is known as the "West"—that is, Eastern Ohio and Western Pennsylvania—is to continue to manufacture iron to the extent that it has heretofore, it must have concessions in wages, and such concessions as will bring the labor cost of the iron produced somewhere near to the labor cost of the iron produced in other sections with which it comes into competition.

A compilation of consular reports upon the state of labor in Europe, just issued from the Government Printing Office, makes it appear that since the adoption of the protective system by Germany in 1875 the wages of workmen in many branches of industry have been materially reduced. In the Bremen district, which is selected for comparison, wages of journeymen masons, which in 1875 were \$5.71 per week, have fallen off to \$3.64; hod men from \$4.84 to \$3.20; carpenters from \$5.35

to \$3.80; blacksmiths from \$5 to \$4.17; brass foundrymen from \$6.42 to \$3.93, &c. The greatest decrease is in the wages of agricultural laborers, which have fallen from \$107 and \$215 per year, with board, to \$50 and \$86. An argument will probably be found here for the enforcement of laws for the exclusion of American products, whether manufactured or natural.

### Judson's Automatic Fire-Alarm.

An automatic fire-alarm of simple construction, known as Judson's automatic fire-alarm, has recently been brought out, the essential feature of which is a wire soldered together at frequent intervals by a very fusible alloy, the melting of which parts the wire and sets off the alarm. The alarm consists of a clock mechanism mounted in a suitable manner on a board 4 x 6 inches in size. From this alarm a wire ascends to the ceiling and thence passes over pulleys through the various rooms, closets and apartments in which a fire is liable to occur. The clockwork is kept from unwinding by a click, to which a lever-arm is attached extending beyond the casing; to the end of this lever, at the side of the alarm, is fastened a spiral spring, which, when distended, holds the lever in place. The spring is kept in a state of tension by the wire, which passes through the building and is securely fastened at its further end. Highly fusible connections, already mentioned, placed about 10 feet apart, unite the different sections of the wire. When the temperature of a room through which the wire passes rises to about 130° F., the connector melts and parts the wire, the spring contracts, raises the click and sets free the alarm mechanism, by which a bell is rung violently for some minutes. It is not necessary that the flame come in contact with the connections, since, melting at so low a temperature, the heat, in case of fire, would be sufficient to set off the alarm, though as an extra precaution a cotton thread may be hung from the joints, which, taking fire, will serve in some cases to give the alarm more quickly. From the above brief description a general idea may be gathered of the working of the alarm, the advantages claimed for it being simplicity, reliability and the absence of electric batteries or similar accessories. The inventor is Prof. C. H. Judson, Greenville, S. C.

**Consumption of Coke on the Pacific Slope.**—The San Francisco Mining and Scientific Press says that large quantities of coke are used in the smelting works on the Pacific coast, but none is made there, there not being any quantity of coking coal on the coast. The importations vary from 20,000 to 25,000 tons per year, most of which goes to Utah, Arizona and Nevada. The best coke, known as patent Cardiff coke, costs about \$12 laid down at San Francisco by ship from Cardiff, Wales. This is mainly used by the smelting furnaces in the interior. Some of them have to pay from \$40 to \$50 a ton for it—and sometimes more—by the time the railroad freight, teaming, &c., is paid, when the coke goes very far. The lower grades of coke imported are used by local foundries. This costs from \$8 to \$9 and \$10 per ton. All this coke comes from abroad.

We are glad to see in the New York Legislature an outcry against exorbitant wharfage dues in New York. In 1860 the rates were considered high enough, but in 1870, through Mr. J. S. T. Stranahan, of Brooklyn—himself a pier and wharf owner—the tariff was increased enormously by the Legislature. Meanwhile commerce has undergone a period of unexampled depression, but wharfage fees remain the same, as follows: For every vessel of 200 tons burden and under, 2 cents per ton; and from every vessel over 200 tons burden, 2 cents per ton for the first 200 tons and 1/2 of 1 cent per ton for every additional ton per diem. There is reason to believe that wharfage charges in New York yield a profit wholly disproportionate to that derived from other descriptions of shipping property, and constitute a frequent abuse from which all commercial interests suffer.

Messrs. Goodfellow & Matthews, engineers and millwrights, of Hyde, England, have in course of construction a fly-rope pulley of unusually large dimensions. The diameter of the pulley is 34 feet, and its weight, on completion, will be about 83 tons. It is intended for the factory of the Astley Mill Company, Limited, near Hyde Junction. Owing to the great size of the pulley, it is being made in many separate pieces. While a comparatively small similar machine might be constructed of four pieces, the present is being made in 50. There are 32 grooves to the pulley, and the ropes are to be of 1 1/4-inch diameter. As each rope will be capable of transmitting 40-horse power, the total power will be 1280-horse.

The plan of settlement in connection with Oliver Bros. & Phillips and the Oliver & Roberts Wire Company has been somewhat modified. It is understood that the trustees appointed under the composition feel that to undertake the management of both concerns would be too much of a tax upon their time and energies, and it was also thought that some large creditors should be represented among the trustees. As the result Mr. John S. Slagle, of Nimick & Co., Pittsburgh, and Major Luther S. Bent, of the Pennsylvania Steel Company, at Harrisburg, have been chosen trustees of the Oliver & Roberts Wire Company.

The Senate has confirmed the nomination of Lucius H. Foote, of California, to be Minister to Korea. With our diplomatic relations in Korea established on a better footing we may hope that the American treaty will prove to be of some practical value.

Secretary McCulloch, on the recommendation of the Supervising Inspector of Steam Vessels in New York, has called for the resignation of Jesse H. Strickland, Inspector of Hulls. The allegations are negligence and inefficiency.

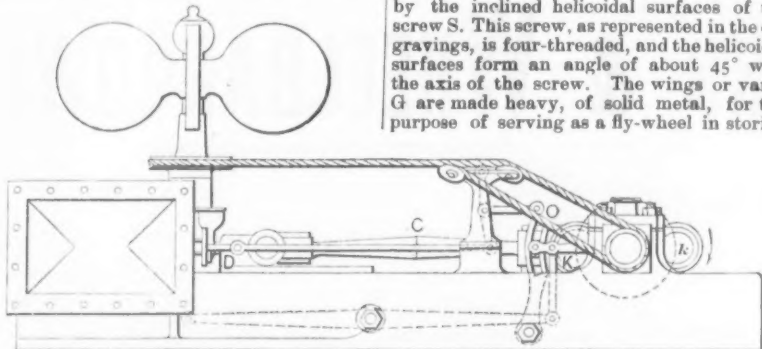






## Nystrom's High-Speed Engine and Governor.

At the recent Philadelphia Electrical Exhibition, Mr. John W. Nystrom, of that city, exhibited his improved high-speed twin engine, which was built by the Eagle Iron Works, of Philadelphia, Pa. The engine was specially designed for driving machinery direct at a very high speed, as required for dynamos, fans, centrifugal pumps, &c., and,



Nystrom's High-Speed Engine and Governor.—Fig. 1.—Side Elevation of Engine.

as it embodies some peculiar features, our accompanying engravings may not be without interest.

Fig. 1 represents a side elevation of the engine. Fig. 5 is a plan of the engine, showing how the moving parts are balanced. Fig. 3 shows the counterpoise for balancing the gyration of the cranks. The engine consists of two steam cylinders A A, Fig. 5, placed side by side, the pistons of which are connected direct by piston-rods B and connecting-rods C, to balance opposite cranks K k. When in motion the piston, piston-rod and connecting-rod of each engine move in opposite directions, and thus the momentum of the two reciprocating systems balance each other. The motive power is applied direct from the piston to the crank—that is, the piston-rod and connecting-rod of each engine are in the same straight line when the cranks are on the centers. The two steam cylinders are cast in one piece, making only one thickness of metal between them, and, as represented in the engravings, the bed plate is cast in the same piece with the cylinders, which insures rigidity. The two cranks K k are made in one piece, opposite to one another, and balanced for gravity, centrifugal force and gyration. A revolving body balanced for gravity may not be balanced for centrifugal force and gyration, and it may be balanced for both gravity and centrifugal force, but not for gyration, which latter is most generally the case. When a revolving body of high speed is not balanced for gyration, the slightest change of speed will make the system shake or vibrate. In order to overcome this difficulty Mr. Nystrom makes a counterpoise k, on each crank, of equal form to that of the part K, Figs. 3 and 5, which balances the revolving crank for gravity, centrifugal force and gyration. Without the counterpoise k the opposite cranks would be balanced only for gravity, but not for centrifugal force and gyration, which two latter forces would work and shake the system

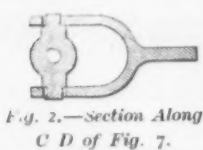


Fig. 2.—Section Along C D of Fig. 7.

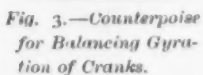


Fig. 3.—Counterpoise for Balancing Gyration of Cranks.

when running at a high speed. When the counterpoise k is of a different shape from that of the part K, then the system may be balanced for gravity and centrifugal force, but not for gyration, as is generally the case in propeller engines, where the counterpoise is made of a different shape from that of the crank. The center part, K', Fig. 5, of the cranks is of equal form to that of K and k, and is therefore balanced. The two crank-pins, with their collars, balance one another. The reciprocating systems—that is, the steam piston, piston-rod B, crosshead D and connecting-rod C of each engine—move in opposite directions, and therefore balance one another very nearly, but not perfectly so on account of the connecting-rods being of definite lengths, but when the length of the connecting-rod is three times the length

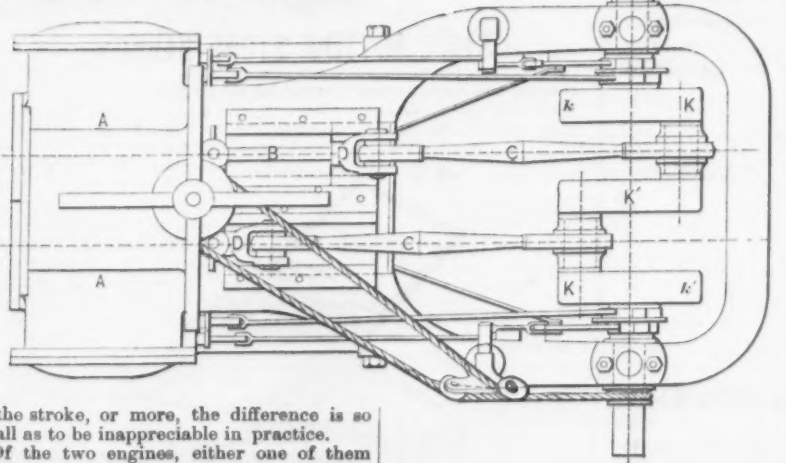


Fig. 5.—Plan of Engine.

of the stroke, or more, the difference is so small as to be inappreciable in practice.

Of the two engines, either one of them can be used with steam, while the other can run empty and only serve for balancing the reciprocating systems; or, if the weight of metal in the piston and piston-rod of the empty engine be placed in its crosshead D, it would also balance the reciprocating systems, but would not work so well in the journals as with steam in both cylinders.

The speed of the engine is kept uniform by an isochronous governor, shown in detail in Figs. 2, 4, 6, 7 and 8. Fig. 7 represents a

vertical section through the axis of rotation, showing the internal arrangement of the governor. Fig. 8 represents a horizontal section through the dotted line A B, Fig. 7. Fig. 2 is a horizontal section through the line C D. Figs. 4 and 6 show how to set the governor for regulating different speeds. As represented, the governor is rotated by a rope, R, over a pulley, P. The rope R rotates only the sleeve E, which is fixed to the pulley, and the screw-spindle S, on which are fixed the arms F and vanes G, is rotated by the inclined helicoidal surfaces of the screw S. This screw, as represented in the engravings, is four-threaded, and the helicoidal surfaces form an angle of about 45° with the axis of the screw. The wings or vanes G are made heavy, of solid metal, for the purpose of serving as a fly-wheel in storing

discharging energy when regulating steam to the cylinder. The vanes are placed on the arms so as to be set at any desired angle, if such should be considered expedient but they can also be made solid with the arms.

When the governor is in motion the resistance of the air to the revolving vanes tends to raise the screw; this tendency is counteracted by the weight of the system, which tends to lower the screw, and thus the system G F S is balanced between two opposing forces when run at a proper uniform speed; but the moment the speed changes, one of the opposing forces overcomes the other, and the screw moves up and down for regulating the steam. When the pulley P, with its sleeve E,

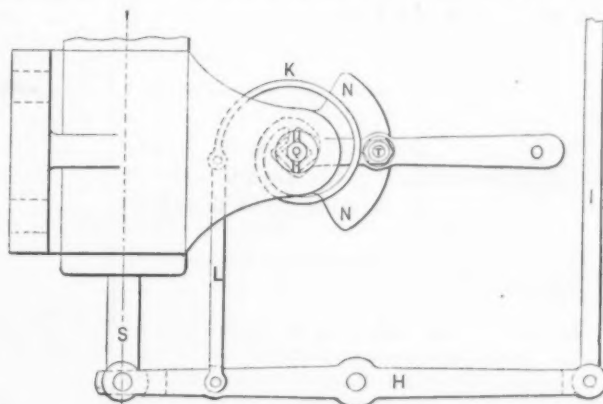


Fig. 6.—Diagram Showing How to Set the Governor for Different Speeds.

is driven faster than the normal speed, it will screw up the system G F S, by which less steam is admitted to the cylinder; and when run slower than the normal speed the screw will descend and admit more steam by suitable connections with the throttle-valve or valve-gear. The universal joint shown in Fig. 2, with the

Fig. 4.—Diagram Showing How to Set the Governor for Different Speeds.

lever H, operates the rod I, which is connected either to a throttle-valve or to the valve gear for changing the grade of expansion as required by the load. The throttle-valve can also be connected direct to the center spindle S, and the governor mounted on the valve-head, like in the ordinary centrifugal governors. The spring K is connected to the lever H by the link L for the purpose of regulating the proper speed of the engine, which can be accomplished while the system is in motion by making the spring to push or pull more or less on the lever, so as to make it act either with or against the weight of the system G F S. This ac-

of the spring K, the system must run slower to balance the same forces.

The arrangement for setting the spring K so as to act either with or against the weight of the system G F S can be made in

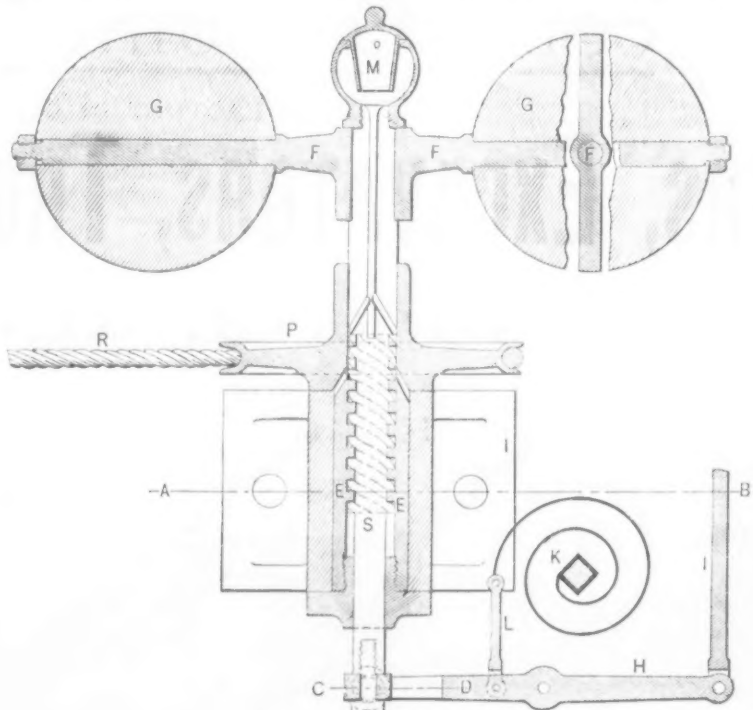


Fig. 7.—Vertical Section of Governor.

a great variety of ways, depending also upon what kind of spring is used. For the spiral spring K, as shown, a lever, O, Figs. 4 and 6, can be placed on the square part of the shaft Q (indicated by the dotted diagonal

lines), close to where the spring is fixed, and the other end of the lever extending over an arc, N N, upon which it can be clamped by the set-screw T, or by notches, like the reversing-lever in marine engines. The lever and spring should be so adjusted that, when the lever stands on or near half the arc, there should be no tension on the spring; when the system G F S stands in the middle of the limited vertical space, it can move. Then, when the system falls, the spring will act against the weight, and, when the system rises, the spring will act with the weight. By setting the lever O in different positions on the arc N N, the tension of the spring is made to act with more or less force, either with or against the weight of the system G F S, for the whole vertical space the system moves. When the spring is made in the form of a screw helix its tension can be regulated either by a screw or by a lever.

The oil-cup M is for lubricating the governor through the holes in the center of the spindle, and also the slanting holes in the sleeve, which is readily understood from the engravings. A slight change of speed of the en-

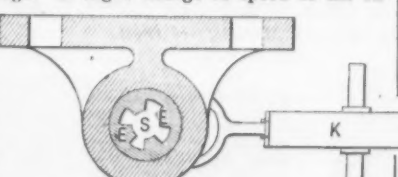


Fig. 8.—Horizontal Section Through Dotted Line A B of Fig. 4.

gine is necessary for operating the governor; but after the admittance of steam is regulated the engine resumes its normal speed, while the governor admits the steam required for the load. For a sudden change of speed of the engine the momentum of the heavy vanes will instantly screw up or down the system G F S, and thus regulate the admittance of steam to suit the load. The system G F S is perfectly isochronous, and is consequently an unstable regulator; but with the aid of the spring K, which action varies with its tension, the combination makes the regulation stable.

## The Judson Mfg. Co.

From a San Francisco journal of recent date we obtain the following sketch of the history, plant and products of the Judson Mfg. Co.:

One of the most important of these great Pacific coast industries, started after the last spike of the Pacific Railroad had been driven, is the Judson Mfg. Co. The company is composed solely of men of wealth, and about \$750,000 was expended in erecting buildings, furnishing machinery, &c., for the works. These works are situated in West Oakland, on the bay shore, and cover many acres. There are rolling mills, machine and blacksmith shops, &c., the equipments in all departments being complete and of the most improved patterns. The works are divided

into departments, such as mowing-machine shops, foundry, file works, tack works, paint shop, rolling mill, wood works, molding-room, finishing-room, &c. Three hundred and fifty employees are engaged regularly,

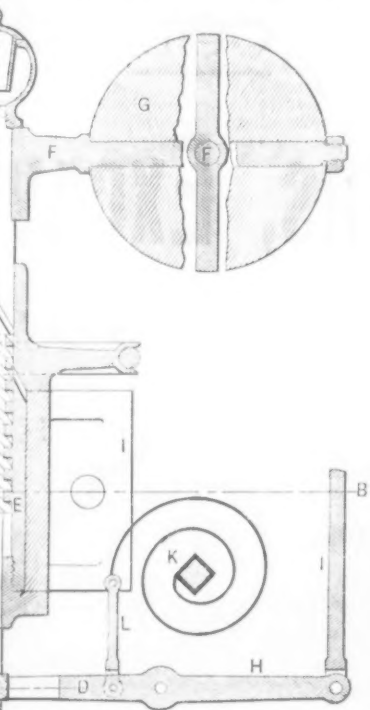
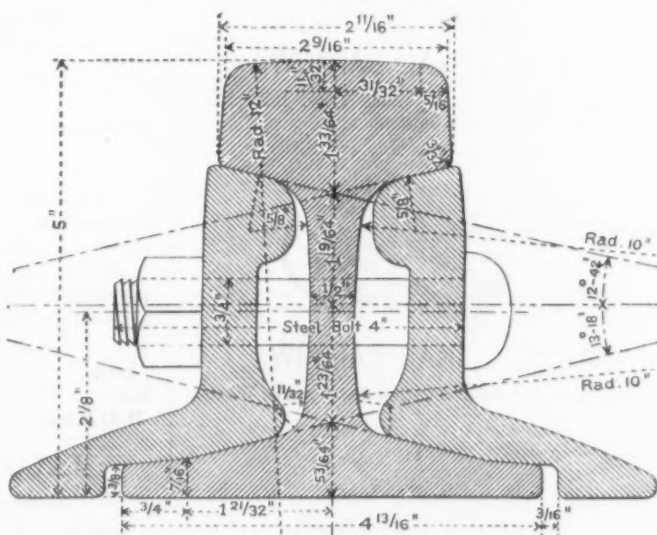


Fig. 7.—Vertical Section of Governor.

and it takes five steam engines to drive the machinery of the establishment. There are many ingenious machines in the works, not a few of which have no duplicate in any other factory. Included in this machinery is the largest shear for cutting iron in the United States, and the only machine in the Union for cutting glaziers' points capable of producing 2,000,000 points a day.

The Judson Company make files, tacks, hardware and bar iron and the "California Victor" mower. Some 350 kinds of tacks are



Section of Eighty-Pound Steel Rail.

made in the factory—40 tons of iron a month. This industry is now on this coast, as we have stated, and was built up in the face of Eastern competition. The superiority of the Judson tacks is so patent that the full capacity of the department is taxed to supply the growing demand. File-making is another new trade at this side of the continent, and it also comes into direct competition with Eastern and English work. The capacity of this department is 100 dozen files a day. The Judson files have withstood the test of time and use by the best local mechanics, and have been proved to equal, and in some respects to excel, the imported files. Among the articles made at these works are barn-door hinges, and rollers, rails, sledges, bench screws, &c., which are rapidly supplanting imports, because of their being so much better than foreign manufactures. The specialty of the company is the "California Victor" mower. It is made specially for use on this coast, and so constructed that the machine does its work on all kinds of ground and under all circumstances. Although only in use for three seasons, its real excellence has made the "Victor," and it is known everywhere west of the Rocky Mountains. Another specialty of the company, for which the demand is also large and increasing, is the field and orchard harrows and cultivators. These were introduced last year, but their special excellencies soon brought them forward prominently.

The company, as organized, consists of Egbert Judson, president; D. Henshaw Ward, vice-president and manager; C. B. Morgan, secretary, and John Finn, assistant manager. These gentlemen are all eminently qualified for the conduct of such an immense concern. They are possessed of great enterprise; personal integrity, as is shown in the confidence reposed in them by the public; and executive talent of a high order, as shown in the excellent arrangements and smooth working of the different departments. The head offices and sales-rooms have just been removed to No. 8 Pine street, San Francisco.

**American Mining Machinery in Siberia.**—A prospector sent out some months ago by the Russian Government, with the object of gaining information relative to mines and mining to be made available in the working of the mines of Siberia, has, after visiting many mining districts in this country and Europe, advised his Government to purchase American machinery and to adopt a very large number of the im-

provements in which, he says, American miners excel. The machinery purchased will be shipped from San Francisco to the mouth of the Amoor River, whence it will be transported an average distance of 2000 miles into the interior of Siberia. American mining machinery appears to be steadily gaining ground in all directions, its superiority being generally conceded by mining experts.

## An Eighty-Pound Steel Rail.

The following account of an 80-pound steel rail is reprinted from a recent issue of the *Railroad Gazette*:

The New York Central is now using the heaviest rail in this country on the section of its line from the Grand Central Depot to Mott Haven Junction, where the Harlem line leaves the Hudson River line. This portion of the line is about 5 miles long, chiefly in the tunnels or on the viaducts of what is known as the "Fourth Avenue improvement." It has an enormous passenger traffic, including that of the New York Central, the Harlem and the New York, New Haven and Hartford, but not much freight traffic, as the New York Central freight enters and leaves the city by the old Hudson River line. The rail used here weighs 80 pounds per yard, and was laid down last August, and has therefore been now in use sufficiently long to enable its wearing qualities to be approximately estimated. As will be seen from the annexed illustration, which shows a section of the rail, the head is unusually wide and flat, and the foot unusually stout and thick and somewhat narrow for the height of the rail. These proportions have been adopted by the designer, Prof. P. H. Dudley, after a careful study of the facts as to wear of rails on the New York Central, and therefore the rail may be said to have been designed specially for the conditions prevailing on the New York Central.

It was proposed at first, when designing the new rail, to widen the base, so as to prevent the rail cutting into the ties. But the makers of rails objected that there were considerable practical difficulties in rolling a wide base, and still further difficulty in making a rail with a wide base contract in cooling so as to be straight under continued heavy traffic. Further investigation showed, moreover, that the pressure on each individual tie might be lessened by making the

rail stiffer, so as to distribute the weight of a loaded wheel upon three or more ties, instead of allowing a weak, bending rail to concentrate it on one. The rail, therefore, was especially designed with a view to vertical stiffness. It is estimated to be 42 per cent. stiffer than the present standard 65-pound rail of the New York Central. About the heaviest steel rails of a flat-footed section ever rolled were those designed by Mr. B. Baker for the Metropolitan Railway, in London. They were specially designed on the opposite principle, to obtain sufficient bearing surface on the ties by means of a broad base rather than by any unusual vertical stiffness. These rails were 4½ inches deep against 5 inches of the New York Central, while the base was no less than 6¾ inches wide, against 4½ inches of the New York Central. The weights were nearly equal, the English rail being slightly heavier (84 pounds), but the New York Central rail is estimated to be 28 per cent. stiffer.

The increased width has been preferred to increased depth of head as a means for prolonging the useful life of a rail. It is believed not only that the increased width will cause the wheels to run longer by giving them a wider bearing surface, but that it will to some extent prevent the wheels wearing hollow on the tread. Another reason in favor of a wide rather than a deep head was found in the fact that when a rail has worn down a certain distance the surface becomes so rough that the rolling stock is damaged, and it is therefore really more economical to renew the rail than to wear it out. The form of the upper surface of the head was arrived at after careful examination of various worn wheel treads in service, and the head of the rail was curved to fit the average section of the wheel tires in actual service. The result seems very satisfactory so far, as the wear appears to be very evenly distributed over the head. The stout foot was adopted to give plenty of metal to resist the corrosion where it rests on the tie. Rails in tunnels and other wet places have been found with the corners of the flanges worn away to a knife-edge from this cause. Harvey's grip track bolts are used with these heavy rails. The rails are laid to break joints, and are secured to the ties at the ends and centers by Bush's interlocking bolts. These bolts are largely used in the yard at the Grand Central Depot, and a careful personal inspection showed that in every case the rail and tie were held firm together, keeping the line in gauge and surface, and contrasting strongly with the behavior of spikes used in similar situations.



# The Kilbourn & Jacobs Mfg. Co.

COLUMBUS, OHIO, U. S. A.,

MANUFACTURERS OF

## ROAD SCRAPERS, EXCAVATORS, TRUCKS & WHEELBARROWS OF ALL KINDS.

### THE "COLUMBUS" ROAD SCRAPER

Is pressed from *one solid sheet of heavy steel*, and is the strongest and most durable Road Scraper made.

Used in making railroad embankments, excavating for canals, ditching, &c. The largest contractors in the United States have used them exclusively for years.



THE "COLUMBUS" SOLID STEEL ROAD SCRAPER.

We make three sizes of these Scrapers. No. 1, capacity, 7 cubic feet of earth. No. 2, 5 cubic feet of earth. No. 3, 3½ cubic feet of earth. Furnished with or without *solid steel shoes or runners*, as desired.

The bails are of refined iron, with strong and perfect working swivels. Bowls nest and handles crate compactly for shipment.



RAILROAD OR CANAL BARROW.

With Jacobs' Patent Wood Wheel. Bent Tray, full sized, planed and well finished.



RAILROAD OR CANAL BARROW.

Same as above, except with Jacobs' Patent Steel Spoke Wheel.



ORE OR MORTAR BARROW.

With Jacobs' Patent Wood Wheel. All hardwood. Bowl dovetailed together and firmly nailed.



OPEN BOTTOM BRICK BARROW.

With Jacobs' Patent Wood Wheel. Folds for shipping same as Garden or Farm Barrow.



TIGHT BOTTOM BRICK BARROW.

Same as above, except having Closed Bottom. We furnish either style of these Barrows with *Steel Spoke Wheel* when specially ordered.

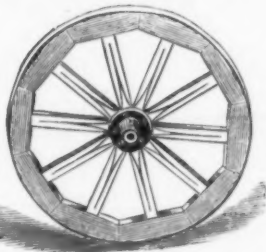


WOOD OR BARK BARROW.

Wheel same as above. Body and Dash strapped with heavy iron. Well finished. For Wood, Bark, Bales, Boxes, &c.

### JACOBS' PATENT WHEELS.

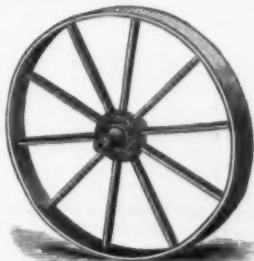
The Strongest and Lightest Running Wheel known.



It will not Shrink in any Climate. The Tire Cannot Come Off.

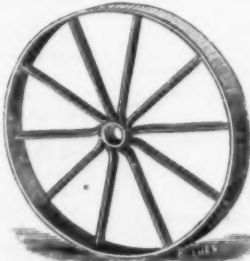
It has *TEN* spokes of thoroughly seasoned wood, and each spoke is supplied with a separate felloe. The hub is of chill cast iron, and riveted firmly to the spokes, which are so cut as to counterbrace each other. The spokes are keyed from the center after the tire is shrunk on. *This wheel will not shrink or give in any weather or climate, and the tire cannot become loosened.* An oil hole is drilled into the hollow washer of the hub, and the oil distributes itself along the bearings while the wheel is in motion. The wheel revolves on a fixed shaft or axle, which passes through the end of the handle, and is a brace to the barrow. This wheel cannot be broken or weakened by ordinary usage, and will last a lifetime. It is well painted. *We guarantee it superior to any other WOOD WHEEL.*

### JACOBS' PATENT STEEL SPOKE WHEELS.



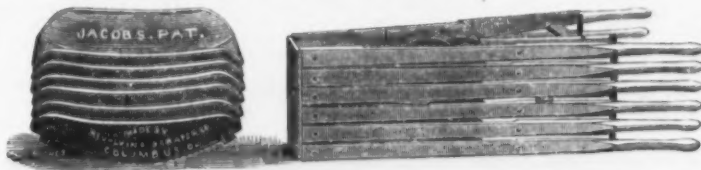
Wheel Complete.

Wrought-Iron Tire. Steel Spokes.



Without Hub—Showing Construction.

These wheels are so constructed—having spokes tightened from center—that the tire cannot come off or the spokes become loosened. Hubs hardened on inside. Oil hole in hub. Diameter of wheel, 17 inches. Wrought-iron tire, 1½ inches wide. *Steel* spokes. *The Best Barrow Wheel Manufactured.*

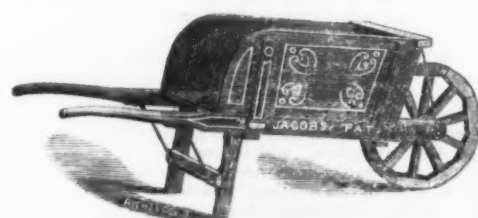


The above cut shows the manner in which our *Railroad, Ore, Wharf and Steel Tray Barrows* are packed for shipment. This insures lowest rate of freight, and they can be quickly and easily set up by following the simple instructions sent with each half-dozen Barrows. In this shape Barrows require much less room for storage, and can be as easily set up as if received with Tray fastened to Frame.



"COLUMBUS" STEEL TRAY WHEELBARROWS.

The Tray is stamped from *one solid plate of steel*. Steel Spoke Wheels 17 inches in diameter. Wrought-Iron Tire, 1½ inches wide. These Barrows, while much *lighter* than those having iron frames, are *equally strong* for all practical purposes, and will stand the roughest usage. Two sizes. No. 1, capacity 3½ cubic feet, for Earth, Sand, Ore and Foundry use. No. 2, capacity 5 cubic feet, for Coal, Manure, Sawdust, Ashes, &c. Pack for shipment same as R. R. Barrow.



GARDEN OR FARM BARROW.

Set Up.

Double Frames and so constructed that by simply removing one bolt (the axle) and two nuts they can be folded flat down (see cut) and shipped at lowest rate of freight. Three sizes.



Folded for Shipping.



STRAIGHT HANDLE STONE BARROW.

With Jacobs' Patent Wheel. Strong, well-made, iron strapped over bottom and bolted together. For stone or pig iron, &c.



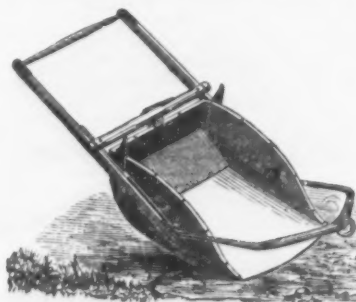
BENT HANDLE STONE BARROW.

With Jacobs' Patent Wheel. 17¼-inch tire. Well ironed and bolted. Extra strong.



STEEL BOTTOM STONE BARROW.

Bottom and Dash formed of *one plate of steel one-fourth of an inch thick*. Steel Spoke Wheel. The strongest and best Stone Barrow manufactured. Very durable.



THE AUTOMATIC REVOLVING ROAD SCRAPER.

Three sizes. 30, 33 and 36 inch. Both Steel and Wooden Bottom.



**Improved Lever Chain-Testing Machine.**

Messrs. Riehle Bros., of Philadelphia, prominently identified with the manufacture of testing machines, scales, &c., have just brought out the improved horizontal testing machine shown in the accompanying cut, and designed for testing chains, wire or hemp rope, bridge irons, &c. It has a capacity of 200,000 pounds, and is claimed to be superior in many respects to those previously turned out by them. The jack is suspended so as to hang freely on knife-edges immediately in front of the weighing mechanism. The steel bearings are so close

engines with compressed air, and so dispense with the risk, expense, trouble and responsibility of boilers.

The scheme involves the doubling of mains in order to prevent interruption from failure at any part, and a suitable meter has been devised, which not only registers the quantity of air passed through, but also the pressure, the company being required to maintain a certain minimum. In estimating the cost of the scheme, 10 per cent. was allowed for loss by friction and the same for leakage, in order to be on the safe side, but there seems no reason why the leakage should exceed 5 per cent., while the estimated loss

**Effects of Obstructions in Gun Barrels.**

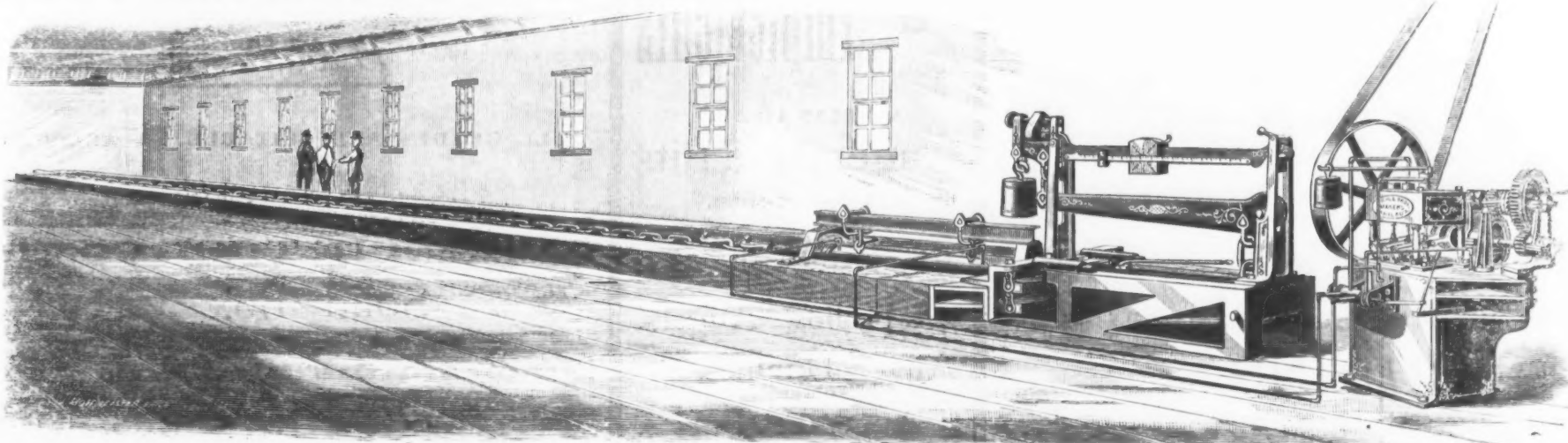
The engravings shown herewith, copied from a photocollotype, show specimens of firearms burst by Capt. W. McK. Heath, at Philadelphia, Pa., 1884, in some tests (supplementary to his small arms air-space experiments of 1882-83-84), to show the danger of firing guns (loaded as usual) when the barrel is obstructed. The muzzles point to the right hand. Every barrel is shown exactly as sent by the explosion. Nos. 1, 2, 3, 4 and 5—United States musket, Belgian Cadet musket, Mississippi rifle, W. Deringer's sporting rifle and Prussian musket—

or repairs, the number having risen to five when the Volga left, including the Duguay, Trouin, the Villars and the cruiser Eclairer. The Bayard is of somewhat antiquated pattern, short, broad and unpicturesque, but bristling with guns from her lower gun-deck to her tops, armed with the ever-present Hotchkiss, which the French, having tested both, decidedly prefer to the Nordenfeldt. It was the iron hail from these guns that swept the decks of the Chinese at Foo-Chow and made reloading impossible. Their manipulation is easy. By the aid of a wooden rest for the left shoulder a single man easily adjusts the gun on its pivot to any range,

the first quarter of 1883 the value was £204,655; second quarter, 204,530; third quarter, £200,175. For the corresponding periods of 1884 the respective values were £143,898, £153,672 and £148,911. The amount for the fourth quarter of 1884 is not yet known, but it is certain it will be considerably smaller than for the corresponding period of 1883.

**Statistics of Transportation.**

The Senate Committee on Transportation Routes to the Seaboard is at work, under a resolution adopted by the Senate last July,



IMPROVED LEVER CHAIN-TESTING MACHINE, BUILT BY RIEHLE BROS., PHILADELPHIA, PA.

to the knife-edges of the main lever that instant contact occurs the moment the piston receives the testing strain. At the far end the chain is secured by a link and heavy cross-head. The pump, which is worked by power, is placed on the reservoir, as seen at the right. It can, however, be placed in any position to suit circumstances. This pump is of peculiar construction, differing entirely from other hydrostatic pumps. There are three hollow differential plungers, which by different displacements and the distribution of dead points give a continuous and steady movement of the jack. The valves are protected from dirt, are simple in construction, only two to each pump, and are easily accessible. A four-way balanced valve controls the flow of oil to the front or rear of jack, or returns the water and oil to the reservoir, by the simple movement of a lever. The levers of the machine are all sealed to the United States standard of weight. The operator, standing in front of the weighing beams, has control of the movements of the plunger and can regulate the operation of the pump, and start, reverse and stop it without leaving his position.

The machine is adapted to tensile tests with specimens from 20 inches to 90 feet or longer; square specimens, 2½ inches or less; transverse specimens, 12 inches and over; compression specimens, 50 feet or less; round specimens, 2½ inches or less; flat specimens, 3½ inches or less, by 1 inch or less, and the apparatus is thus available for a large variety of work. The motion of the plunger is 5 feet. In order to convey some idea of the size of the machine, it may be well to give the dimensions of the weighing and power end, which, as supplied by the manufacturers, are as follows:

Extreme height.....5 feet 6 inches.  
Extreme width.....3 " 7 "  
Extreme length.....9 " 10 "  
This does not include length of trough nor hydraulic jack.  
Shipping weight, pounds.....14,175

The extreme length of the machine as shown in the cut is 100 feet.

**The Transmission of Power by Compressed Air.**

The transmission of power by means of compressed air, which has been carried on in parts of the country for mining purposes for some years, is at length about to be adopted in Birmingham, England, on a scale which will thoroughly test its suitability for the work of a manufacturing town. Motive power is nowadays required in not only workshops which are compelled to do without it, owing to the cost of the necessary plant or the difficulty of finding room for it. The gas engine has supplied the wants of small power users who could afford to pay the interest on the capital sunk; but there is a large class who either do not want so costly an engine or who cannot afford it, for the reason that the interest and depreciation would eat up all the profit the engine earned. Hydraulic power is now supplied over a considerable part of the city of London, and is found so useful for working lifts, cranes, &c., that it is likely to be extended over a wider area; but so much remains to be done in the matter of electrical transmission of power that there seems no hope from that quarter for many years to come. The scheme of the Birmingham Compressed Air Company is based on the principle of co-operation for the production of power, and on paper is clearly economical as well as useful. Large mills and factories which are driven by power must of necessity have their own plant, but there are many shops in which power is required intermittently and in comparative small quantities, where compressed air will be welcomed if it can be worked as easily as is done in some coal and other mines. The principal advantages—those which attract the small manufacturers—are the saving of the outlay on capital account, and the facility for averaging the consumption of power among themselves. In the majority of trades carried on in Birmingham there are busy and slack times, but whether slack or busy the plant must be in the factory to produce the power when it is required. It is one of the advantages of the gas engine that it is ready to start at a moment's notice, while it wastes nothing when the task is accomplished, but the scheme of the Birmingham Company is to supply the present steam

from friction is certainly too high, for it varies inversely as the fifth power of the diameter of the pipe for any given velocity, so that a slight increase in the size of a pipe would reduce it to a minimum. Compressed air has been applied to locomotives in mines with great success, and in tunneling operations it is preferred to water-power, as well for its greater economy as for the fresh, cool air it throws into the workings. The area over which the company are empowered to work is about 2½ square miles, and it is believed that the loss of pressure at the furthest point of delivery will be equal to only a few inches of water, for with compressed air there is no condensation in the pipes and very little trouble from freezing, a gas-jet kept burning under the exhaust port of the engine being sufficient to prevent anything of that kind. If deemed advisable, there is no reason why the compressed air should not be heated just before it enters the engine cylinder, and when warmth is wanted in the room there is a double advantage in raising the temperature of the compressed air.

The adoption of compressed air as a motive power will undoubtedly relieve Birmingham of much of its smoke, but it will be of far greater importance to the artisans of the famous town, who for many years have worked as small masters, industrious, independent, and employing their families under their own roofs. Besides all that, it offers

burst by a bullet stuck at muzzle; 6 and 8—shotguns—snow at muzzle; 7—Remington navy revolver—a bullet stuck 2 inches from muzzle; 9—Cadet musket—stuck bullet, middle of barrel; 10, 11—United States rifled muskets—wet sand at muzzle; 12, 13,

aims and fires, another man supplying the ammunition. The missile is a shell, of which 60 can be thrown in a minute. French ships are proverbially lacking in neatness, and I found the Bayard no exception. Her officers had the carelessness of look that comes with



EFFECTS OF OBSTRUCTIONS IN GUN BARRELS.

a possibility of reducing the cost of production by the best of all means—improved processes—without reducing the wage-earning power of the workers. This principle of co-operation in the supply of power has attracted the attention of engineers for many years—perhaps from the time the gasworks first became successful in distributing light, and the experiment to be made at Birmingham in distributing power will be watched with much interest, for if successful it will probably soon be adopted in other manufacturing towns. In actual working cost it is probable that a gas engine gives the greater economy, but in the case of Birmingham the object is to utilize the existing steam engines, merely dispensing with the boilers, and, until such time as electricity can be economically transmitted, compressed air has undoubtedly a wide field.

14—United States rifled musket, Prussian musket and Webley B. L. laminated steel shotgun—mud at muzzle.

**The Hotchkiss Machine Gun.**—A correspondent writing from Kelung, China, last December, says: "The French ships at present here are the Bayard (Admiral Courbet's flagship), the Galissonniere and the Vipere, the last lying just inside the entrance to the inner harbor. Being commonly used as a dispatch boat, she is the one omnipresent vessel of the squadron, making every few days or weeks a circular voyage that includes Kelung, Tamsui, Matsou, Taiwan-foo, Takao, Hong Kong and Saigon. Hong Kong is more of a rendezvous for the squadron than Kelung, there being rarely less than three French ships there for coal

an undesired and fatiguing service. The sailors seen about the decks had none of the neatness and trimness that mark an American sailor on duty. Aside from the guns, which were bright and ready for instant service, things generally wore a dull and rusty appearance."

**A New Labor-Saving Shoe Machine.**—The *Bulletin*, of Natick, Mass., says that there is in successful operation in Marlboro, in the large shoe shop of Timothy A. Coolidge, a machine which bids fair to work a revolution in the pegging or nailing business, and which is of much interest to boot and shoe manufacturers throughout the country. This machine is called the Shepard nailing machine, and it is the only one ever invented which is devoted to the work above referred to. The inventor is Samuel Shepard, of Nashua, N. H., 83 years of age, whose various inventions are well known through the country. The capacity of the machine is to drive into boots and shoes more than 250 wedge-shaped headless nails a minute on from 700 to 1000 pairs in a working day of 10 hours. It does the work of 15 boys in the nailing of the toes in pegged shoes. Its principal strength lies in its power to drive headless nails. The only machine of the kind ever set up is now at work in Marlboro. A company with a capital stock of \$200,000 has been incorporated for the purpose of manufacturing the machines.

The following figures of the trade of Sheffield with the United States during the past few years have been published in England. The total value of Sheffield goods sent to the United States from 1870 to 1883 was £12,517,133. The largest trade was done in 1872, when the value reached the total of £1,734,626. Business then took a downward tendency until in 1875 the year's exports were only £691,232, and in 1878 they touched the lowest figure, viz., £429,016. Then came the boom of 1881, when Sheffield exported to the United States goods to the value of £1,287,401. After that business again fell away till in 1883 the trading was represented by £793,675. A comparison of the business of 1883 with that of 1884 shows that the tendency is still downward. During

on a report that will be a continuation of the Windom report of 1873, and at the same time will extend over a wider field than that report. In the collection of railroad statistics the present committee has vastly more material than the committee of which Senator Windom was chairman had. Then only five or six States had railroad commissioners, and now 25 States have them, and 30 States have provided some degree of railroad regulation, or some machinery for the collection of transportation statistics. The report now being prepared will show the prices of cereals for every month from 1873 to 1883, the receipts and shipments of grain at all seaports and centers of grain trade, and very full statistics of the costs of transportation by rail and by river, canal, lake, and not only on the main lines of transportation, but from interior non-competing points to the great shipping centers. In this branch of the subject the committee has the benefit of information supplied by all the commissioners of the trunk-line pools, and the committee will make for the first time a complete digest of the reports of all boards of trade and like commercial organizations in the United States. As these reports are made up on many different systems, comparisons are difficult and often impossible, and the committee will present the first compilation of these reports on a uniform plan. The information thus tabulated will show the relation of transportation charges to the value of grain, both at the place of production and at the main points of shipment. With the help of the consular service full information of the grain production, prices and costs of transportation in foreign countries will be given, and there will be a digest of all State legislation in regulation of railroads. The committee expects to present this statistical portion of its report before the end of the present session of Congress, and then, if the Senate authorizes it, to pursue the subject further by the taking of testimony on all the points involved, and the committee will recommend that the investigation now being made into the production and transportation of cereals be extended to coal, iron, lumber and cotton, for, while cereals form about one-fourth of the railroad tonnage, coal, iron and cotton form more than one-third. The committee has been at work on this matter for several months, and expects to present a more complete and accurate presentation of our internal commerce than has ever been made before, and a report will be of great service to Congress if it shall undertake legislation in regulation of transportation.

**Gas and Petroleum in Manitoba.**—It is stated that there are extensive deposits of coal at different points along the Western Division of the Canadian Pacific Railway, in Manitoba. Six months ago employees were directed to dig for water, hoping to obtain a pure supply. Instead of water the drill penetrated subterranean gas deposits in several instances and operations were at last suspended. In at least two cases lighted matches were held at the surface of the wells, and the escaping gas was ignited at once and has been burning ever since without any interruption or a sign of cessation. One of the depots of the Canadian Pacific Company has been heated during the winter from one of their burning wells, and it is the general impression that immense beds of coal and deposits of petroleum will soon be developed in that region, and especially in the vicinity of Saskatchewan River. So great is the confidence in the existence of petroleum deposits in the far North that a company has been organized, with R. F. Hurlbert, of Minneapolis, as president, and machinery has been forwarded to Winnipeg. The burning wells are about 60 miles south of the company's works, but the projectors of the enterprise have no doubt that oil will soon be brought from the North instead of the East.

A serious accident occurred on January 10 at the hot-blast furnaces of Crawshaw & Sons, Cinderford, just as one of the furnaces was about to be tapped. It appears that the inside lining of the furnace had been worn considerably, but without the slightest warning the brickwork collapsed and an immediate blow-out became necessary. It is feared that some months will elapse before the damage can be repaired.



**LINDSAY & McCUTCHEON,**  
STAR IRON WORKS,  
**Hoop Iron, Band Iron, Wagon Box Iron,**  
HAME IRON.  
Hoop Iron Galvanized to Order.  
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**LONG & COMPANY,**  
VULCAN FORGE AND ROLLING MILLS,  
**Merchant Bar Iron,**  
FLATS, ROUNDS AND SQUARES.  
CAR AND LOCOMOTIVE AXLES A SPECIALTY.  
Special Attention given to the manufacture of Axe, Hatchet and all kinds of Tool Iron.

**WEST LEBANON ROLLING MILL CO.,**  
MANUFACTURERS OF  
Cable Crane, Block, Machine Harriers, Car Brake, Dredging and Trace  
**CHAINS**  
OF EVERY DESCRIPTION.  
OUR "TESTED CHAIN" IS SUCH BY ACTUAL TEST.

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**IRON NAILS AND SPIKES,**  
FIRST QUALITY.

**WM. A. IVES & CO.**

MANUFACTURERS OF

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LARGEST LINE OF  
**Augers and Bits**  
IN THE WORLD.

Expansive Bits,  
Hollow Augers,  
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AND  
Auger Bit Braces.

THE BEST LINE IN THE COUNTRY.

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ALL GRADES AND SUITABLE TO ALL PURPOSES.

ASK FOR QUOTATIONS.

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TESTED

**COIL AND CRANE**  
**CHAIN.**

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**L. M. DAYTON,**

AMERICAN BOLT AND NUT WORKS,

**Carriage Bolts, Tire Bolts, Machine Bolts,**

PLOW BOLTS, STOVE BOLTS,

Screw and Strap Hinges, and Harrow Teeth.

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MANUFACTURERS OF

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RAILROAD AND CLAY PICKS, TAMPING PICKS, COAL  
PICKS, SURFACE AND DRIFTING PICKS,

**BOTH ADZE AND ROUND EYE.**

Also No. 1 R. R. Barrows.

All Goods Guaranteed.

**E. JENCKES MFG. CO.**

Bright Wire Goods,  
SPRING PINS AND KEYS,  
AND  
BELT HOOKS.

**STARR BROS.' BELL COMPANY,**  
*Patent Gong Bells, Hand Bells,*  
ENGINE BELLS,

SHEEP, SLEIGH AND CHIME BELLS.

ESTABLISHED 1840.

**NORFOLK SHEAR COMPANY,**  
Shears, Scissors and Trimmers.

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**First-Class Files Only,**

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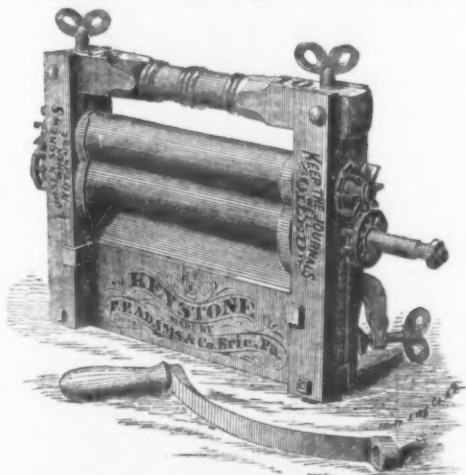
# THE F. F. ADAMS COMPANY OF ERIE, PA.,

MANUFACTURERS OF

## Patent Household Articles.

SEND FOR ILLUSTRATED CATALOGUE OF 1884.

*The Celebrated Keystone Wringer.*



THE LATEST THING OUT.  
*Ideal Mouse Trap.*

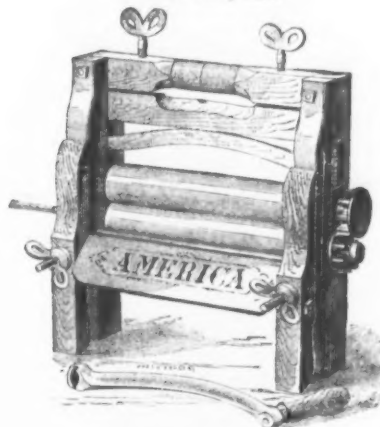


*Cyclone Mouse Trap.*  
PATENTED NOV. 6, 1883.

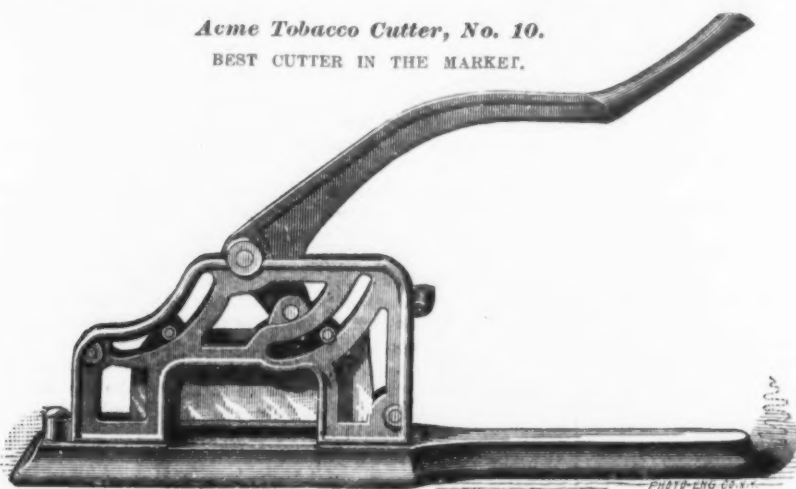


200,000 SOLD SINCE JAN. 1, 1884.

*The America Wringer.*  
No. 8, Family Size

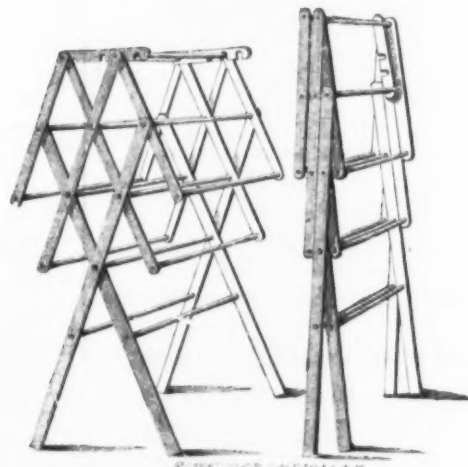


*Lovell's Patent Extension Ladder.*  
Patented October 22, 1867, and August 4, 1874.



*Acme Tobacco Cutter, No. 10.*  
BEST CUTTER IN THE MARKET.

*Excelstor Clothes Horse.*

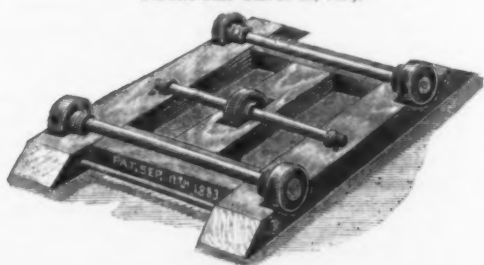


*Common Ladders.*

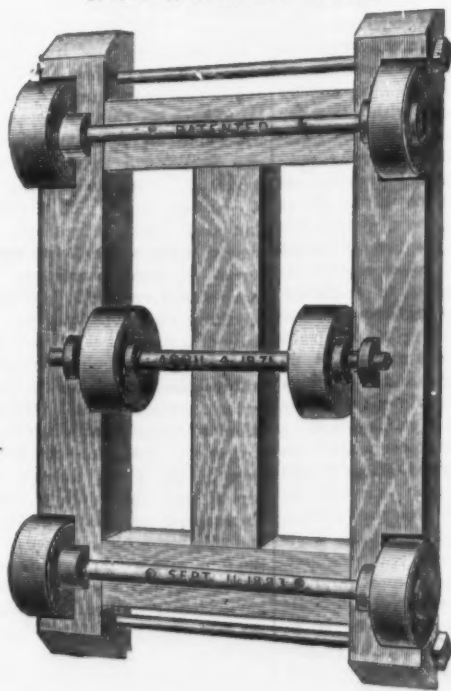


FROM 10 TO 30 FEET.

*The Adams Iron-Wheel Truck.*  
PATENTED SEPT. 21, 1883.



*No. 3 Warehouse Truck.*



*Adams Safety Step Ladder.*  
PATENTED FEB. 3, 1880.



*Reversible Clothes Horse.*  
PATENTED.



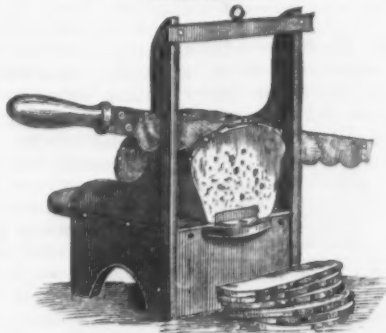
*The Adams Five-Wheel Truck.*  
PATENTED SEPT. 11, 1883.



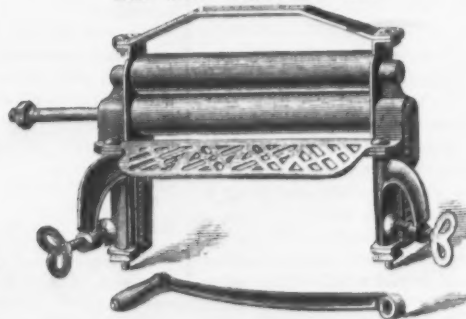
*The Nonety Carpet  
Whip and Cloth-  
ing Beater.*



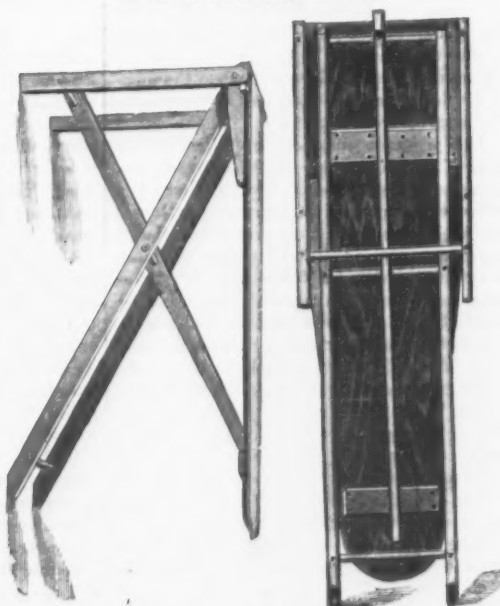
*The Adams Bread Cutter.*  
PATENTED.



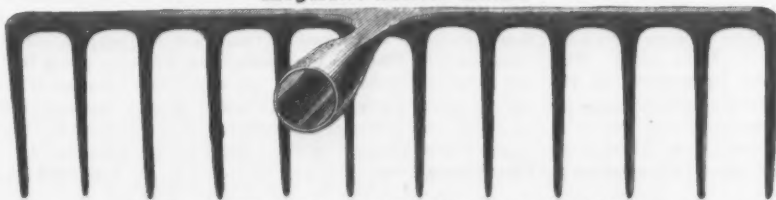
*Our New Style No. 11.*



*Adams Ironing Table.*



*Keystone Socket Rake.*



THIS IS THE ONLY SOCKET RAKE IN THE MARKET.



# The Iron Age

## Metallurgical Review.

New York, Thursday, February 5, 1885.

DAVID WILLIAMS, Publisher and Proprietor.  
JAMES C. BAYLES, Editor.  
JOHN S. KING, Business Manager.

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### Reissued Patents.

The dissenting opinion of Mr. Justice Miller in the case of *Mahn vs. Harwood*, which appeared in full in a recent issue, is one of the ablest examples of legal reasoning we have met with in some time. It is especially interesting and important, as it reopens for argument a principle very much doubted at the time by the public and the legal profession, but supposed to be settled by the decision of the Supreme Court of the United States, in the case of *Miller vs. The Bridgeport Brass Company*, three years ago. That decision is reaffirmed in this last case of *Mahn vs. Harwood*, as the majority of the court overruled the views of Justice Miller; but the soundness of those views, as expressed in his opinion, may influence the other or future members of the court when the question arises again, or may call the attention of Congress to the matter.

The principle enounced by Miller vs. The Brass Company has been misunderstood, and needs to be defined and carefully limited in order to be properly apprehended. It was not held there (as has been asserted) that a patentee is not entitled in a reissue to claims coextensive with his invention. That doctrine has never been doubted, and is law today. But it is stated that he will not be entitled to such a reissue, "unless he with all due diligence surrenders his patent for reissue and proves that his omission to claim at first what he now claims arose wholly from inadvertence, accident or mistake. The great point of controversy between Mr. Justice Miller and his associates lies just here. The latter assert as matter of law, that "such lapse of time as indicates his (the patentee's) want of due diligence is fatal, and the re-

issue, if granted, will be void." That is, the court in a suit between the patentee and an infringer will review the action of the Commissioner of Patents and declare his action void. Justice Miller holds that the commissioner's decision is final and cannot be reviewed by any court in an action between private individuals. The only method of impeaching a patent or a reissue on the ground of improper delay—*laches*—(that not being one of the five grounds for declaring a patent void enumerated by the statute) is an action by the Attorney-General representing the United States against the patentee. This very point has been held over and over again, particularly in the case of *Mowry vs. Whitney*, 14 Wallace, 441. It is a well-established principle that a grant of the Government—like a patent—cannot be impeached collaterally, unless otherwise provided by statute. There must be a distinct proceeding for that purpose. The weight of logic and authority, if we may venture to differ from the majority of the Supreme Court judges, is in favor of the latter view. The argument of Justice Miller sustaining this position is exceedingly able, profound and far-reaching in its consequences. It is developed with great clearness, learning and skill, and is evidently the result of the matured reflection of a legal mind of the highest order. And the fact that it is opposed to and was borne down by the prevailing opinion is no imputation of its correctness. Recent prevailing opinions of that same tribunal—notably in the legal-tender case—have done much to shake the confidence of the American people in the personnel of the court as now constituted.

So far we have been concerned merely with the purely legal aspect of this question. When we come to examine the reasons and motives which led the court to their decision, it is quite easy to see that the judges desired to reform certain abuses, or what they regarded as such, connected with the reissue of patents. However laudable this desire may have been, it cannot excuse a ruling directly in violation of dozens of cases, many of them decided in the same court. It is the business of the bench to interpret the laws, and not to make them. More than this, it may well be doubted whether such a ruling will not produce more evils than those which it was intended to prevent. The abuses referred to consist in the practice, which is growing quite prevalent, of patentees, after they have obtained their letters, waiting one, two, three—or, as in one case, seventeen—years, "until other inventors have produced new forms of improvement, and with the new light thus acquired, under pretense of inadvertence and mistake, applying for such an enlargement of their claims," by means of a reissue, so as to make the later claims embrace these new forms. The court in the Miller case clearly condemned this practice. The language is as follows: "Such a process of expansion carried on indefinitely, without regard to lapse of time, would operate most unjustly against the public. Every independent inventor, every mechanic, every citizen, is affected by such delay, and by the issue of a new patent with a broader and more comprehensive claim. The granting of such a reissue for such a purpose, after an unreasonable delay, is clearly an abuse of the power to grant reissues, and may justly be declared illegal and void." It is to this last statement that Mr. Justice Miller takes exception. Agreeing with his colleagues to a certain extent, he claims that it is the Commissioner of Patents who may justly refuse to grant the reissue, but, having once granted it, no court can "declare it illegal and void" in a suit between private individuals—by the patentee, for instance, in a suit against an infringer. Such a doctrine practically renders "the labors of the Patent Office of very little value." The statutes enacted by Congress, moreover, permit no such action. It may be said, in conclusion, that, while it is true that the practice of reissuing patents may operate sometimes "most unjustly against the public," it would also operate most unjustly against the inventor if he were to be deprived of his right to protect himself by a reissue in cases where, by inadvertence, he has failed to claim all he was entitled to claim, and the question of *laches* is much more likely to be correctly judged by an able and specially-trained commissioner than by an irresponsible jury.

In view of the bursting of a 6-inch breech-loading gun on board the British ship *Active* a short time since, the engravings in another part of this issue illustrating the effects of obstructions in gun barrels will prove of more interest than might otherwise have been the case. The gun was a new one, weighing 81 cwt., and the firing of the scaling charge to clear out any foreign matter which would cause fouling was for some reason omitted. The gun was fired with a half-charge of 17 pounds and with a common shell weighing 100 pounds, and about 5 feet of the muzzle end of the piece were carried bodily away. As the material was good and sound, and no question as to any special system could be raised, it was conjectured that the projectile was wedged and checked by some hard body lodged in the lacquer of the metal. This offers a very probable explanation for the occurrence, the effects of almost insignificant obstructions being very strikingly shown in the engravings just mentioned. Though the experiments in these cases were confined to

small arms, it is not improbable that small objects may act similarly in heavy guns, and investigations in this direction would no doubt yield interesting results. The importance of this matter becomes apparent when we consider that a bullet might readily be projected down the bore of a piece in action with possibly disastrous results.

### Our Exports of Iron and Steel.

Our attention has been attracted to an article in a recent issue of the *Philadelphia Press*, bearing under the title, "Exports of Iron and Steel," the very taking sub-head, "How they exceeded in 1884 the value of the imports for the first time." We are free to say that this remarkable announcement caused a feeling of great surprise to come over us, mingled with the most acute chagrin to think that it had been left for some more watchful observer to discover this great fact. The reports which periodically come to our table from the Bureau of Statistics of the Treasury Department have been our special delight for years. We linger over their bewitching tabulated statements with as keen satisfaction as any young lady takes in perusing the pages of the very latest novel. Others may content themselves in merely glancing over the table of contents, but, as for us, we begin conscientiously with "Animals, n. e. s." (Noah's especial selection, we suppose, the abbreviations mean), and we never let up on a word or a figure until we strike "Brought in foreign vessels: steam, sail," when we know we are at the end of the chapter.

When the report for the fiscal year 1884 was received we gave it as careful and thorough an examination as we had ever accorded any of its predecessors, notwithstanding the drawback that it reached us in installments. Our readers will doubtless bear witness to this fact, for many of them, we are sure, must remember skipping sundry tabulations which had a forbidding look, notwithstanding the skill with which we flatter ourselves we led the text up boldly to the tables, and then smoothed it down afterward with a few well-assorted sentences to deaden the effect or relieve the shock. We remember those tables of exports and imports as well as if it had been yesterday. We recall the prodigious mental effort we expended in adding up the long columns, to be sure that we had the right result. Our figures were as follows: Imports, \$41,464,599; exports, \$21,921,962. According to this showing there was quite a preponderance of imports over exports. Of course the preponderance was not so great as it had been the year before, when we imported \$60,194,191, and exported \$22,834,066, but for all that it was still, it must be admitted, a very fair excess of the value of the imports over the exports.

But does the *Press* writer use the same figures? He does, but only to a certain extent. He omits from the import tables the values of tin plates and iron ore, with this remark: "In the official table for 1883-84 'the values both of iron ore and tin plate are footed with iron and steel, while in all previous years they are separately given.' He assigns no further reason for excluding the values of these two commodities from the comparison than that they had been separately given in previous years. Now, if iron ore should not be classed with iron and steel, then copper ore should not be classed with copper, nor any other crude forms with finished articles. Tin plates are more closely related to iron and steel than to anything else, consisting as they do principally of iron or steel, being in this respect more worthy of such classification than agricultural machinery, which the *Press* writer groups with iron and steel exports in an effort to expand still further the reported figures on that side of the account. But even if the *Press* writer's position be accepted, and the value of iron ore and tin plates is not included with the value of iron and steel generally, we are obliged to record the fact, and we do it with pain, in view of the exposure of a serious statistical error by an evidently well-equipped statistician, that the following statement which he makes is not true:

The official records recently made public for the commerce of the last fiscal year show that the exports of iron and steel, and of machinery and manufactures of iron and steel, from the United States to foreign countries exceed in value the imports of all iron, steel and manufactures of iron and steel for the first time in the history of this Government.

We will demonstrate the falsity of this remarkable statement with a short table, in which we will place side by side the values of iron and steel exports and imports, excluding iron ore and tin plate, for the calendar years 1875 to 1878, inclusive:

	Imports.	Exports.
1875.....	\$15,364,216	\$16,092,906
1876.....	10,584,136	11,794,748
1877.....	9,105,328	16,656,075
1878.....	8,943,043	18,360,369
Total.....	\$43,996,733	\$62,807,098

In each of these four years the exports of iron and steel (not including agricultural implements, scales and balances, sewing machines and fire engines and apparatus) exceeded the imports, and for the whole four years the excess of the value of the exports over the imports was \$13,820,940. It is therefore plain to us, and we trust that we have made it plain to everybody else, that we were not nodding when we examined the report for the fiscal year 1884 and failed to make the brilliant discovery recently spread before the gaze of the readers of the *Philadelphia Press*.

### Congratulations.

Mr. George W. Cope, for the past year and a half Associate Editor of *The Iron Age*, has this week severed his connection with this journal to assume the responsible office of secretary of the American Iron and Steel Association, with headquarters in Philadelphia. While extremely sorry to lose so valuable a member of our staff, we congratulate Mr. Cope upon his election to an office of national dignity and importance, and especially do we congratulate the American Iron and Steel Association on the acquisition of an officer so brilliantly fitted by taste, education and experience for the delicate and accurate work of its office. Mr. Cope is a gentleman of rare qualities, versatile but thorough, incisive but discreet; possessing at once a lively imagination and sound, practical common sense, he has all the qualities which fit him for the work he has undertaken, which we understand to be largely statistical. A statistician needs to be ingenious and in some degree imaginative, as well as painstaking and thorough. The mere compilation of figures is but the basis of his work; to properly analyze them, discover their meaning and point out the conclusions to be drawn from them demands a much higher range of talent. Mr. James M. Swank has fixed the standard of efficiency in the secretaryship of the association so high that we know of no other man than Mr. Cope who could take up the work where Mr. Swank leaves it, and carry it successfully forward. Mr. Cope has our best wishes. His connection with our staff we shall always remember with pleasure.

The vacancy created by Mr. Cope's resignation has been filled by Mr. Charles Kirchhoff, Jr., who returns to *The Iron Age* after several years of successful labor in other fields. Mr. Kirchhoff is so widely and favorably known that he needs no introduction to our readers. The Editor finds great cause for congratulation in the fact that so able and accomplished a gentleman, with so varied an experience, will henceforward share his labors and responsibilities.

### Compulsory Silver Coinage.

The visit to Washington City last week of Sub-Treasurer Acton, President Coe, of the American Exchange Bank, and several other prominent financiers of New York, was naturally regarded as of special significance. Common report attributed to their movements some object closely connected with the workings of the United States Treasury and the Clearing House system, it being alleged that a difficulty had arisen in reference to silver certificates. Simultaneously the National Silver Convention at Denver, Col., passed resolutions demanding the "free" and unlimited coinage of gold and silver "bullion at the present standard of coinage," also the literal execution of the provisions of the Bland bill. By the same resolutions it became evident that the Pacific States are resolved to push the silver question to its furthest limit. The issue, therefore, is now fairly and squarely presented—on one side the silver producers, on the other the people, through their guardians, the national banks.

The Secretary of the Treasury, in his last annual report, gave due warning of coming trouble. He said: "Unless the coinage of silver dollars and the issue of silver certificates are suspended there is danger that silver, and not gold, may become our 'metallic standard.' It happily occurs that for the present our foreign trade balance stands in favor of the United States, and our exports compared with imports show a considerable preponderance. The danger spoken of is not immediate. But we may easily discern the signs of the times. There is a cloud in the horizon not far away. The ordinary observer may see that at any time a demand for gold surpassing the available resources of the Treasury must precipitate a crisis, for inability to respond in the gold standard must result in the substitution of a baser standard 15 per cent. below that of gold. Forthwith our entire basis of valuation governing mercantile transactions becomes inverted—that is to say, demonetize the large sum in gold now in the country, something like \$600,000,000, and severe contraction is inevitable, equal to the shrinkage in the dollar constituting the money of the people. Not only this, but our hoarded surplus of gold would speedily find its way to Europe, gold being at a premium. 'Legal tender' would suffice for all domestic transactions, unless barred by special previous contract, while gold alone would satisfy foreign creditors.

The steady drift of events toward the end here contemplated is too plain to be mistaken. Despite the demand by the General Government for nearly \$2,500,000 silver bullion for coinage every month, the price of silver in London has dropped since the present coinage law was passed from 55½d. to 49½d. per ounce, so that the tender of an 85-cent dollar, in the absence of assurance that it was instantly convertible into gold, would bear on its face a flagrant imposture. So obvious is this fact that Senator Sherman, to avoid gross scandal and virtual repudiation, a few days ago proposed, in his place in Congress, that "every dollar hereafter issued from our Treasury should contain 470 or 480 grains of silver," to equal the gold equivalent. Senator Sherman said: "Suppose such an alarm were sounded as should lead to export of our

gold and disarrange all our standards of value—what would happen? Did not Senators know that it would create the most fearful contraction of the currency ever witnessed in this country? Laboring men when supposing themselves to be earning '\$1 would be earning only 85 cents, and 'wages would not advance to make up for the deficiency.' Our shrewdest bankers urge with a warmth bordering on vehemence that silver coinage should be summarily stopped. They point to the fact that, of 190,000,000 silver dollars already manufactured, only about \$40,000,000 are in circulation, despite the liberal offers of the Government to defray the cost of its transportation to distant commercial centers. The Treasury vaults are all filled to their utmost capacity. Nevertheless, bankers are confident of their ability to endure the pressure in maintaining the existing standard, provided Congress quickly interpose for their relief. "Could we be assured by Congressional enactment," say they, "that one year hence silver coinage would cease, the present surplus might be 'gradually absorbed and the gold unit of stability be preserved.' Meanwhile, strengthened by such a guarantee, mercantile distrust would give place to confidence and business men enter upon a new career of prosperity."

The position of the national banks is somewhat equivocal. Under the law they have no option but to accept silver if offered. The United States Treasurer has not seen fit thus far to press his authority to its limit, and will refrain so long as no exigency arises to make such a step imperative. In the contingency at any time possible, if the banks still determined to hold their place in the national system they would most likely act on the principle of paying depositors in kind, silver in return for silver, gold for gold. In regard to the effects on trade, W. A. Camp, the Clearing House manager, remarks simply that "by debasing the currency the value of commodities passing into consumption would be 'appreciated.' In other words, we may anticipate an era of extraordinary speculation, detrimental to all legitimate enterprise. But we may believe, with Mr. Camp, that in this, as in trials that are past, 'the country would be equal to the emergency.'"

### Sales on the Installment Plan.

A bill was introduced on January 27 by Senator Thomas in the New York Legislature, of great importance to manufacturers and business men generally who sell on what is known as the installment plan. It proposes to exempt from the operation of the statute passed last year, and which went into effect September 1, 1884, known as the "Act requiring contracts for the conditional sale of personal property on credit to be 'filed in the town clerk's office,' three articles hitherto covered by it, viz., furniture, sewing machines and pianos. This statute was intended to remedy certain evils connected with such sales. The manufacturer or dealer, for example, would sell such an article as a printing press or a sewing machine and deliver it to the purchaser. At the same time it would be agreed that the article should be paid for by installments, and that no title should pass until all the installments were paid. Quite frequently, also, the seller reserved the right to retake possession at once, or after a certain number of days, in case any installment should be due and remain unpaid. These contracts have been and are very common, and in the aggregate amount to many millions every year. This is especially true of sales of sewing machines, pianos and furniture, as the manufacturers of those articles sell very extensively to persons who are unable to pay for them immediately in cash, and the sales are, therefore, made on credit in the manner described.

The difficulty arises just here. The purchaser, after receiving possession, but before the payment of all the installments, sometimes sells to a third person, who buys in good faith and has no knowledge of the other's contract, with its conditions. He is what the lawyers call a *bona fide* purchaser for a valuable consideration. He pays the full value of the article. Who now has the better title or right to it, this honest buyer or the manufacturer—the original seller? Before the passage of the act of 1884 the Court of Appeals held that the original seller had the better right, and the last buyer must lose his money. This was on the ground that a man has a right to his own, wherever he finds it. The act quoted changed the law. The Legislature thought that the seller, by giving possession of the property to another, gave him the opportunity to deceive a future buyer as to its true ownership by claiming it as his, and that it was a great injustice to the public to make a man suffer loss who relied on the possession as a proof of such ownership. Consequently, it is the manufacturer who must lose. This bill of Senator Thomas, though not in form, yet in effect, repeals the statute, as by far the largest proportion of such contracts refer to sales of furniture or pianos or sewing machines. It is clearly in the interest of the manufacturers, and was no doubt prompted by them. Much may be said in its favor, as it is unquestionably a hardship for a man to lose his property, yet we doubt whether the other rule is not, on the whole, more equitable. We shall watch its future progress through the House with a great deal of interest.



## The Explosion of Natural Gas at Pittsburgh.

Following so closely after the explosion of natural gas at a mill at Kittanning, the catastrophe at Pittsburgh on Friday last is a sharp warning that with the blessings of this cheap fuel are associated some serious drawbacks. The discussions of such fatalities in the daily press, unfortunately, generally reflect only the righteous indignation of the writers, covering, as they do, gross ignorance in the majority of cases. Experience with the usual sharply-worded editorials on fire-damp explosions has fully taught how little good they accomplish in enlightening the public as to the causes of such disasters or in suggesting means for their avoidance. Agitation of this kind has done far more harm than good, and there is even danger that the natural-gas interest will in a similar manner suffer from embarrassments growing out of misapprehensions created by the wild talk of laymen. It cannot be denied, however, that the employment of natural gas for industrial purposes will meet with a check, and that its future as a fuel for domestic purposes is uncertain. We believe that a sharp line should be drawn between these two fields of usefulness. In the case of the former it is under the care and supervision of officers and men of whom many, if not the majority, have had a great deal of experience in handling producer gas, which, too, is not free from similar dangers. Possibly, in their eagerness to improve the present crude method of burning the new fuel, the needed precautions against its explosive qualities may have been neglected. It is a different matter with the burning of natural gas in dwellings. The care of looking after the gas naturally devolves upon servants or ignorant householders, who, as experience has too often taught, are liable to commit the gravest blunders. So long as, in the case of kerosene, they practically endanger only themselves, no serious objection can be raised; but when it becomes a question of trusting them to keep fire-damp from exploding, the matter becomes one of grave public import.

Natural gas is in some cases almost pure marsh gas, or, as it is called by miners, fire-damp. The range of mixture with air within which it will burn explosively is comparatively narrow, being from 10 to 12 per cent. of marsh gas by volume in the air. When the percentage is smaller or greater there is no immediate danger. The possibility of disaster was fully appreciated as soon as the natural gas began to come into extensive use, and a committee of the Western Society of Engineers of Pennsylvania made a number of suggestions looking to securing greater safety. Among these were the recommendations that the pressure in the street mains should not exceed  $5\frac{1}{2}$  inches of water, and that automatic cut-off valves be provided to close the pipe conducting to premises if the supply should at any time fail while the gas was being used. It has been urged, furthermore, and this is an important point, that the gas be mixed with some substance which would give it a distinct odor, so that any escape of gas could be immediately detected. Bisulphide of carbon has been pointed out as a most suitable substance for the purpose.

From the accounts thus far received in reference to the Pittsburgh disaster, it would appear that none of these recommendations have been followed in this individual case. It is stated that the gas escaped from a defective high-pressure main into the cellar of the house in which it was ignited. The case is not one, therefore, which can be directly quoted as proving that there is so much danger in the use of natural gas as a domestic fuel that public safety demands that it be prohibited. It merely proves that high-pressure mains carelessly laid in the streets of a city imperil adjacent dwellings. Still, the accident does unmistakably show the necessity of extreme caution even with low-pressure gas, and in their own interest the natural-gas companies should insist that the simple precautions already mentioned be strictly observed in the future. The public is, like individuals, inclined to form likes and dislikes, often on a flimsy basis. It has been the disregard of trivial grounds for dissatisfaction that has ultimately led to hostile legislation, with its endless and costly agitation. Sound business policy will therefore dictate to the natural-gas interest to do not alone what is absolutely necessary to protect the public, but to go even further, and to do what is asked for, even if it may not be considered absolutely necessary, so long as it is not unreasonable.

As for the employment of natural gas in mills and factories, the lines must not be so sharply drawn. The dangers which grow out of ignorance are not so great. It would, however, be well to formulate more precisely than has yet been done the precautionary measures which should be strictly lived up to. We believe that the duty and responsibility of caring for the natural gas should be delegated to one person in every establishment, under whose personal supervision every fire should be lighted, who alone would have access to valves, who would be the only one to test daily for leakage the entire pipe system, and to whom all work connected with it should be referred. What limited protection against explosions the Davy lamp and its improved modern forms may give in collieries is lost in the employment of natural gas above ground,

and therefore even greater vigilance is necessary to prevent dangerous accumulations of explosive mixtures.

During the past few weeks the daily newspapers—and, we regret to say, many others who should have known better—have given space to a lot of scientific trash which, in one shape or another, has been published at intervals for a number of years. It seems that Mr. John Collett, State Geologist of Indiana, has been diligently trying for a long time to make the results of a series of experiments conform to a preconceived theory—certainly not a very difficult task—and we are consequently not surprised to hear that he has been eminently successful. But when, in the accounts now in circulation, we find the statement that "Mr. Collett's experiments disclose nothing new—nothing that has not been known for half a century"—we must object most decidedly. Mr. Collett, as many of our readers probably know by this time, has devoted his energies to the old and threadbare subject of crystallization of iron and steel, and while some of his opinions—whose correctness, by the way, has been very clearly disproven—have been shared by others, his assertion that all iron in structural service will infallibly, in the course of time, exhibit the form of deterioration which he calls crystallization, is certainly new, startling, and last, but not least, ridiculous. Had Mr. Collett been better prepared to take up this subject and to venture opinions without laying himself open to well-merited criticism he would have known that a crystalline appearance in iron or steel, or crystallization, as he chooses to term it, is never produced in a structural member properly proportioned for its work, and that the evidence of such crystallization in old railroad bridge members and other pieces examined by him was due to overstrain, brought about by greatly increased loads since the erection of the structures from which the specimens were taken, and the lack of provision for them. Under the circumstances the confusion of terms and results which distinguish his remarks are readily explained, and it is to be regretted only that they may be accepted in some quarters as being of any importance. It has been stated that the specimens which Mr. Collett collected for his investigations are to be sent to Stevens Institute of Technology, though for what purpose we do not understand. If he expects them to prove desirable for further experiments whose results will reflect favorably upon his work, we fear he is doomed to disappointment.

The originators of the rapid-transit scheme across the Atlantic, whose enthusiasm was dampened considerably some two years ago by the utter failure of their much-spoken-of steamer Meteor, seem to have gathered new courage, and are now trying to impress the public with the vast importance and extraordinary advantages of a new steam boiler brought out by them. Those who had given attention to the Meteor and her machinery and knew of the rather remarkable claims made for her at the time will not be greatly surprised when they hear that Mr. P. A. Bliven, her designer, and the inventor of the new boiler, claims for the latter an evaporative power of 16 pounds of water per pound of coal. That such a performance is a physical impossibility does not seem to have occurred to Mr. Bliven, and, with his profound disregard for everything that savors of theory in such matters, it would be quite useless to attempt to convince him of his error. Assuming, however, that the boiler suffers no loss whatever from radiation, that not the slightest degree of heat is expended in heating the air necessary for the combustion of the coal in the furnace, that the whole plant is theoretically perfect, and allowing nothing for non-combustible matters and ash, then, according to Mr. Bliven's claim of 16 pounds of water to 1 pound of coal, the latter must contain about 15,457 heat-units. Developing this from a material capable of yielding less than 14,500 heat-units per pound (the heat of complete combustion of carbon) is unquestionably remarkable, and Mr. Bliven is to be congratulated upon his wonderful achievement, unparalleled in the history of steam engineering. We do not know what basis Mr. Bliven has for his claims, but are somewhat inclined to regard it as similar to that supporting his claims for the Meteor, and in that event our readers will be best able to judge of its value for themselves.

Western rivers as a highway for transportation are fast passing out of existence. Everywhere railroad bridges form continuous connections for traffic, regardless of the navigable streams flowing beneath, now almost abandoned by vessels of every description. Thirty years ago St. Louis had 60 large steamers in the Cincinnati and Pittsburgh trade, and almost as many between that point and New Orleans. At the present day St. Louis has not a single "packet"—in fact, the name itself is almost forgotten, and the total arrivals at the levees are not over 40 a week.

We see that the so-called co-operative system of ironworking that was so prevalent in some parts of the West during the last depression is proposed again, if it is not already in force at some mills. The system of co-operation adopted is for the works to furnish capital, raw materials, &c., and take the

product and sell it on account of the workmen, advancing them a portion, generally 60 to 75 per cent. of their wages, and retaining the balance until the goods could be sold. Whatever profit accrues is to be divided among the workmen in proportion to their earnings. So far as we remember, there was no case in which there was any profit to divide, so that the system is, in effect, working for reduced wages. The Amalgamated Association, for this reason, refuses its consent to the proposition, and it has failed of adoption.

Strong endeavors are making in England to influence workingmen in favor of the colonies. As stated by a prominent speaker before the London Workingmen's Association, it was essential for workingmen as a class that England and her colonies should be welded together, both in regard to commercial and future territorial aspects. No effort will be spared to turn the current from the United States into new channels, in furtherance of a grand scheme for the federation of the Empire.

We appear to have a very fair trade with Guatemala and San Salvador, though far less than we are entitled to in virtue of geographical position. In the year 1884 we exported from New York to Guatemala merchandise to the value of \$240,287, comprising 1495 packages of machinery, valued at \$53,500, and 3818 packages of hardware, valued at \$42,387. To San Salvador our exports comprised merchandise valued at \$220,500, of which \$28,718 was hardware and \$16,218 machinery. The latter also took sewing machines to the value of \$14,261.

The St. Louis Globe-Democrat prints the following news item:

The American sheet mill in Phillipsburg, N. J., has resumed work after being idle since Christmas. It employs 135 men. The old mill of the Bethlehem Iron Company has started up. The company will next week blow in one of its furnaces. Work in Spiegel & Eisen's furnace, Lehigh Zinc Company, is being pushed forward, and it is expected that fires will be relighted in 10 or 12 days.

Newspapers should be careful in making statements of this kind. Messrs. Spiegel & Eisen write us that they have temporarily suspended work in their furnace, and are in negotiation with Messrs. Bessemer & Steel for the sale of the property to them.

California is rejoicing in the prospect of extraordinary exports of wheat. At last 65 vessels under engagement for this trade, with a capacity equal to 150,000 tons, or 3,000,000 centals of wheat, all of which will be afloat by March 1.

## Slashing Prices.

Our editorial comments on the recklessness with which some salesmen make unnecessarily low prices for goods have called forth the following communication from an esteemed Chicago correspondent:

To the Editor of The Iron Age.—SIR: Your remarks on "slashing prices" by so-called salesmen is so apropos that I desire to add my experience as a seller of nails. There is no doubt in my mind that there is greater reason to call the attention of nail manufacturers to this growing evil than any other branch of business. There is less discrimination used in the selling of nails by these so-called agents or salesmen than is generally supposed, and yet they are not so much to blame perhaps as the principals who employ them. The ones who do the "slashing" are in the great majority, and unfortunately there don't appear to be any way to suppress them. Of the many instances that have come under my personal observation I may mention a case that occurred recently. While the members of a certain district were in session devising ways and means of raising the prices of nails to a point where there was no loss, not to speak of any profit, the so-called salesman of one of the mills was rushing among the trade to secure orders, and which he succeeded in doing at prices away below the terms his principal was pleading at the convention to have the price put to. These are facts, and yet he was in all human probability acting under instructions from the mill. Again, there is the "friend" who cannot sell nails at the same price that any one else can. This class is very numerous. Honor among manufacturers is what is wanted, and until this boon has been granted there will be no confidence established. I hope a full discussion of this very important question in the only journal in this country which is the text-book of all will have beneficial results.

NAILER.

In view of the uneasiness and apprehension created throughout the trade when it is known that some one is being favored with specially low prices, it would seem to be the correct policy of sellers to adhere as closely as possible to market rates. This appears to be so self-evident a proposition that it almost constitutes an axiom. Yet at the risk of ridicule we seriously state it and desire to impress it as forcibly as possible upon those who sell goods. If salesmen are reckless and only consider a big trade the point to be reached, they should be held firmly in check. But if principals are to blame for "slashing" prices they have evidently mistaken views of conducting business which should be radically changed. Buyers are more disposed to purchase freely if they have some reasonable assurance that rates are fairly maintained among sellers generally. But when they find that a seller here and there will make a huge reduction, they very naturally postpone the purchase of goods as long as possible, hoping by delay to be able to make a more advantageous bargain with the manufacturer. Thus it is that the demoralization is often effected, for the salesman who would ordinarily hold to market prices is forced by this abnormal and ruinous competition—if we may classify "slashing"

with such legitimate practice—to quote prices for his goods so far below the market that he may not lose his customer. It is quite useless, however, to address the ordinary salesman with any hope of effecting reformation, for, being in one sense an irresponsible agent, it is of comparatively little difference to him at what figure he disposes of his goods. It is the manufacturers and jobbers through whom this reform must come, if at all, for they are primarily interested in keeping up prices, and they alone can regulate the actions of their traveling salesmen and confine them to certain limits of prices in disposing of their goods. As this is a subject of much practical importance, particularly in times of depression like the present, when but a slight reduction means a transition from profit to loss, we would be glad to hear from others interested in the subject, so that a general expression of opinion might aid in reforming the abuse.

## Obituary.

LUTHER G. TILLOTSON.

Luther G. Tillotson, a prominent merchant, died at his residence in this city on the 31st ult. He was born in Ithaca, N. Y., March 1, 1834, and received there an English education. When about 15 years old he went West with his father, the late Daniel T. Tillotson, a constructor of telegraph lines, where he learned telegraphy. After a year he returned East and entered the telegraph service of the Erie Railway Company, of which, when 19 years old, he became superintendent. In this position he remained several years, adding to his duties those of a division superintendent of the Western Union Telegraph Company. Early in 1862 he began business in this city as a merchant in railway and telegraph supplies. The house was known as Tillotson & Co. On November 1, 1865, Mr. Tillotson, with Gen. E. S. Greeley and Mr. W. H. Holt, founded the present house of L. G. Tillotson & Co. During the past 20 years Mr. Tillotson has been associated with all the most eminent men in railway and telegraph construction. His opinions were almost universally sought in enterprises of this character, and his cooperation very frequently solicited, with offers of positions of trust and honor, which he generally declined because they would distract his attention from his main object—a successful mercantile career.

## Improved Regenerative Gas Furnace.

At the last meeting of the South Staffordshire Institute of Iron and Steel Works Managers an interesting paper was read by Mr. John Head, entitled "Heating by Radiation as Applied to the Regenerative Gas Furnace." The new method of heating referred to by Mr. Head was that explained by Mr. Frederick Siemens at the last meeting of the British Iron and Steel Institute, and consists essentially in allowing a large space for the combustion of the gases and utilizing the heat by radiation. In the course of his remarks Mr. Head said:

"In order that combustion may be perfect, it is almost absolutely necessary that gas should be the fuel employed, for, with the very best arrangement and form of grate furnace, and with the most perfect stoking, it is not possible to prevent a certain amount of smoke being formed when fresh coal is charged. Professor Rankine states that there is a difference of 25 to 50 per cent. between the performance of a good and a bad stoker employed on the same furnace. In a gas furnace, on the other hand, the gas and air may be supplied in the exact proportions necessary to produce chemical combination or perfect combustion, and by this means the highest temperature is attainable of which the available fuel is capable in a large or open space. This is not so, however, within a closed space in which the gases have not room to combine without coming in contact with its limiting boundaries, for in this case smoke would be produced and soot deposited upon the surfaces, as may easily be shown by placing a cold body, such as a glass rod, within an ordinary gas flame, upon which lampblack will be immediately deposited. This action is most marked when the rod is cold, but takes place, though in a less degree, at any temperature, for the reason that the material to be heated is always at a lower temperature than the flame, and also owing to the disturbance in combustion caused by contact of the solid substance with the flame. As regards increasing the intensity of the heat—that is, raising its temperature within the combustion chamber—this was the main object for which the regenerative gas furnace was introduced, and this result has been so firmly established that it is quite unnecessary to refer to it at greater length.

"It is upon the importance of the third point—that of applying heat through radiation at one stage and heat by conduction at another stage of the total heating—that it is now intended to lay stress. The various stages through which combustion passes were first referred to in Mr. Frederick Siemens' paper, and were specially treated of in his remarks during the discussion of that paper. There are two special stages, each of which performs separate functions and requires special treatment for its development and application. During the first or active stage the whole of the heat is developed by the essentially chemical process of the combination of gas with air; and at this stage it is necessary that the flame should be kept absolutely free from contact with any solid substance whatever, so that it may both produce and radiate out its heat freely. In the second or neutral stage, on the contrary, the products of combustion should be brought into the most intimate contact with the surfaces to be heated, because they do not injure the substance upon which they impinge by chemical or physical action, but heat them in the most effectual manner by direct contact. In designing furnaces so that the flame shall not come in contact with any portion of their structure, it is evident that they must be of very large proportions, Mr. Siemens maintaining that they cannot be made too large from an economical point of view, the radiation from a body of flame increasing in a much greater ratio than the increase in its area.

This is at once evident when it is remembered that a flame radiates from every point within it, and upon its surface in every direction—that is, from every point of its whole volume—while the external walls and roof of the furnace, being formed of solid substance, only radiate from their outer surfaces, so that it may be laid down as an axiom that the loss of heat from a furnace into the external atmosphere only increases in the same measure as its increase of dimensions, while the production of heat increases in a square ratio. But besides the increased production of heat due to perfect combustion within furnace chambers of large proportions, the furnaces themselves last much longer, owing to the flame not impinging upon and so destroying the material of which they are composed, while, for the same reason, there is less oxidation of the material heated or melted upon the furnace-bed.

"This new system of applying heat within the modified regenerative gas furnace has now been employed for a sufficiently long period to establish the economy of the method as well in regard to the fuel used as to the material of which the furnace is constructed and that treated on its hearth. One of the latest and most interesting applications has been to the open-hearth steel-melting furnace. At the Landore Works the furnaces which were altered this time last year are still at work, a result entirely unprecedented in this class of furnace, which, as is well known, is worked at the very highest temperature employed in the arts. But, besides the longevity of the furnaces, they are found to work more uniformly, while the yield is larger, owing to there being less oxidation of the metal, as is proved by more ore being used per ton of pig iron in order to decarbonize it to the same extent. The furnaces work much more uniformly, and with great economy as regards consumption of fuel. Various other steel works throughout the country, and several glass works, are now modifying their furnaces so as to obtain the benefits offered by this new method of heating, which will be found to be advantageous also where steel is proposed to be made from inferior brands of pig iron by the adoption of basic lining."

Mr. Head continued his remarks by pointing out the many applications that could be made of this improved method of heating, including reheating and puddling furnaces and the heating of boilers, and referred to a glass furnace constructed by Mr. Frederick Siemens, at Dresden, which had given the most satisfactory results. He concluded his paper by saying that the regenerative gas furnace will, when the principle of the exclusive application of the radiant heat of the flame to the heating chamber is made in a thorough and efficient manner, give results which will far surpass any that have been obtained from it hitherto, and that its application in the arts will be multiplied to a degree which even its warmest admirers would scarcely have thought possible a short time ago.

Washington Territory Coke.—Mr. W. H. Fife, of New Tacoma, Wash. Ter., noticing in *The Iron Age* of October 25 an article stating that no coal had been found on the Pacific Slope which would make satisfactory coke, sends us a package by express of coke made in a pit at a coal mine near Wilkeson, Wash. Ter. Mr. Fife states that they have made over 500 tons of this coke and are selling it to the foundries there and in Portland, Oregon, where it is giving as good satisfaction as the English coke. He states that the company making it have an 8-foot vein of the coal from which this coke is made. The samples Mr. Fife sends us seem to be a very fair quality of coke, more resembling English than Pennsylvania qualities. Whether from inherent weakness or from the shocks it has received in transcontinental transportation in a paper box it seems to be rather brittle, and we should scarcely expect it to hold up much of a burden in a furnace. We should also judge from its appearance that the percentage of ash runs somewhat higher than one would expect to find in strictly first-class coke. It is, however, unquestionably a practical fuel, and we are glad to learn that there is an abundant supply of coal from which coke of as good quality as this can be had.

The Edgar Thomson to Resume.—The Edgar Thomson Steel Works, of Pittsburgh, reached an agreement on Monday of this week with the Amalgamated Association of Iron and Steel Workers as to rates of wages for the current year, involving a reduction of from 10 to 15 per cent. Owing to improvements in methods that have been introduced into the works, the entire scale has been remodeled. The greatest reduction is in skilled labor, the lowest in common labor. The rates govern the entire year. The mill, which has been idle during these improvements and repairs for some five or six weeks, will resume operations as soon as possible.

The English ship, the Daphne, which, as our readers will remember, capsized some time ago, when launched, seems to be a peculiarly unfortunate vessel. We find it stated that she was raised and renamed the Rose, but only to be sunk at her anchor in harbor. Again raised, she ran ashore, was t off with difficulty and named *en route* the Lanthe, and a short time ago, *en route* to Smyrna, she struck a rock on the Irish coast and was laid up for repairs.

The Chicago and Northwest Railway Company have placed an order for 40 locomotives, the larger portion of which is expected to be taken by the Baldwin Locomotive Works, in Philadelphia, the balance by the Schenectady Works, at Schenectady, N. Y. The company are also placing orders for about 500 cars, some of which, it is expected, will be built in Pennsylvania.

The Merion Iron Company's Elizabeth Furnace, at West Conshohocken, Pa., re-molded and managed by Mr. Davis Keeley, is now producing, after six weeks' blast, 50 to 60 tons daily of first-class Nos. 1 and 2 foundry iron.



















# Trade Report.

## New York Iron Market

**American Pig.**—There is a little more inclination to buy, and the volume of business transacted in filling small orders has in the aggregate increased somewhat, making the market steadier. The urgency with which deliveries are insisted upon in many cases furnishes abundant evidence of the fact, frequently alluded to, that buyers are keeping very closely within actual immediate requirements. Good buyers find it a somewhat more difficult matter to obtain concessions on standard brands in consideration for inducements offered, which in the past have generally proved too tempting to be resisted. Outside brands are, however, still offered at liberal concessions. Future developments in regard to the Anthracite Coal combination are looked forward to with some expectation by buyers. They argue that the prospect of lower prices of Anthracite Coal hold out a hope for lower cost of production, in which they cannot help participating, and some point to the comparatively low prices of old material as an indication that Pig Iron has not yet found its lowest level. It is urged, on the other hand, that the rears now a number of furnaces in blast which are only running because they hope for early relief in the matter of cheap fuel. These furnaces, it is stated, are now running at a loss, and would not force a lower level of values if a Coal war placed them in a more favorable position. It is rumored that a number of the Cast-Iron Pipe-makers have placed their contracts to cover requirements of orders taken at low figures in the East. The demand for Piping for natural gas is in abeyance, owing to the diversion of the attention of those interests through the recent casualties. We continue to quote standard brands of Lehigh and North River Irons, tidewater delivery, as follows: No. 1 X Foundry, \$18 @ \$19; No. 2 X Foundry, \$17 @ \$18; Gray Forge, \$16 @ \$17. The outside figure is asked for special brands.

**Scotch Pig.**—Business continues on a limited scale, and arrivals aggregate only about 300 tons. The only transaction of any amount of which we hear is the placing of 500 tons of Coltness for delivery over a number of months. Nominal quotations for 5 and 10 ton lots are as follows: Coltness, \$21.50 to arrive; Gartsherrie, \$21 to arrive, \$22 from yard; Shotta, \$21.50 to arrive, \$22 from yard; Langloan, \$21.50 to arrive, \$22 from yard; Carnbroe and Glengarnock, \$19.50 to arrive, and \$40.50 from yard; Summerlee, \$20.50 @ \$21 to arrive; Dalmellington, \$19.50 to arrive; Eglington, \$19 to arrive; Clyde, \$19.50 to arrive. On large lots concessions are made.

**Bessemer Pig and Spiegeleisen.**—The market is very quiet and dull, with Foreign Bessemer Pig nominally at \$19. There have been sales of round lots of Foreign Spiegel, to arrive, at a concession from our nominal quotations, which we repeat, as follows: \$26 for 20 % and \$30 for 30 %.

**Bar Iron.**—The trade is very dull, and only a development of the demand can bring about the hoped-for improvement. As yet there are no indications of increased buying, except in isolated cases, and the low figures current are having the effect of restricting the quantity of Bar Iron offered in this market. While some mills are offering at low figures, others decline to sell even at our highest quotations. Quotations, as nearly as they can be learned, are represented by the following range: Common Iron at mill, 1.35¢ @ 1.6¢; from store, 1.6¢ @ 1.9¢; Best Refined at mill, 1.65¢ @ 1.9¢; from store, 1.9¢ @ 2¢.

**Structural and Shaped Iron.**—The severe weather, affecting, as it does, the activity in the local building trades, makes the trade small in volume. Quotations for small lots continue to be nominally as follows: Angles, from store, 2.3¢ @ 2.6¢; Tees, from store, 2.8¢ @ 3¢, with the usual difference of price at mill. Beams and Channels are 3¢ on dock for all orders. There is some dissatisfaction in the Beam trade. Business is very quiet and it is urged that, with a productive capacity considerably greater than current or immediately prospective wants, a reduction in the price would be a wise movement for more than one reason. Present figures make the importation of Foreign Beams possible, and in times when purchasers closely canvass the market, and their margins are very small, they are inclined to accept the bids of agents of foreign makers, in spite of the many inconveniences which they may suffer from in placing their orders with them. Thus far German Beams have been the only ones which have competed, their sections being similar to those of our own mills, while the Belgian sections are clumsy. Until now the efforts of foreign agents appear to have been directed toward capturing small orders supplied direct from stock. It is urged that there is some danger of an increase in the volume of this business, which should be met by putting prices lower, and thus check this movement and at the same time encourage consumption. While such views are expressed by some members of the trade, others deny that there is a sufficiently large margin to induce importations of any magnitude. They state that the recent reduction to 3¢ fully meets the case.

**Plates.**—The business continues quiet. In Steel Boiler Plate efforts have been made on the part of those whose quality does not come up to standard brands to induce business by low quotations. Makers of high-grade Plates, however, show little disposition to meet the low figures thus made. Usual prices of Iron Plates are as follows: Common or Tank, 2.2¢ @ 2.3¢; Refined, 2½¢; Shell, 2½¢ @ 2¾¢; Flange, 3½¢; Extra Flange, 4¢ @ 4¼¢. For small lots of Steel Plates the quotations are as follows: Ship, 2¾¢ @ 3¢ at mill; Tank, 3¢ @ 3½¢ on dock; Boiler, 3½¢ @ 3¾¢ for Shell, 4¢ @ 4½¢ for Flange, and 4¾¢ @ 5½¢ for extra Flange and Fire-box.

**Sheet Iron.**—Sheet Iron continues slow of sale, the season for the buying on the part of cornice manufacturers not having set in as yet. Occasionally some of this class of buyers show a disposition to anticipate their spring requirements. We quote prices of Sheet Iron in our list of New York Wholesale Metal Prices.

**Merchant Steel.**—There are a few signs, slight, it is true, which point to an improvement. Nominal quotations are as follows: American Tool Steel, 9¢ @ 9½¢; Tool Steel of special grades and finer qualities, 12¢ @ 20¢; Crucible Machinery, 5¢ @ 6¢; Spring and Tire, 2¾¢ @ 3¼¢; Open-Hearth and Bessemer Machinery, 2¾¢ @ 3¢; English Tool, 14½¢ @ 15¢.

**Steel Rails.**—In this market absolutely nothing of consequence has been done during the week, and inquiries are few and far between. There have been many conflicting rumors concerning the recent closing of a contract with the Illinois Central for Rails delivered at Chicago. The quantity is variously stated at 10,000 to 25,000 tons, the former figure probably being the correct one. The bulk of the order has gone to a Western mill at \$29 at Chicago. We cannot trace to any reliable source the statement that an Eastern mill participates in the contract. In the absence of business we quote nominally \$26.50 @ \$27 at Eastern mill, though the former figure could be shaded by large buyers.

**Steel Wire Rods.**—Since the majority of consumers are still fairly well stocked, current business is small. For small lots \$44 is still quoted, though concessions varying in magnitude according to quality are obtainable for larger quantities.

**Old Rails.**—The market is quiet. While, on the one hand, there are few buyers, there is, on the other hand, little pressing on the market. Some holders show a disposition to ask higher prices, and the feeling has somewhat improved. We quote \$16.50 @ \$17.

**Old Wheels.**—Small sales continue to be made, and we note the placing of a small lot of extra choice at \$19. The price varies within a wide range, according to quality, and we quote \$16 @ \$19.

**Scrap Iron.**—In some quarters a better feeling is reported, and we hear of sales aggregating 700 tons, the bulk at \$17.50, and some at \$17.75. Some holders are inclined to demand higher figures. Others, however, still quote the range from \$17.50 to \$18 for No. 1 Wrought. Buyers appear to have little confidence in the maintenance of any advance.

## Philadelphia.

Office of The Iron Age, 220 South Fourth St., Philadelphia, February 3, 1885.

**Pig Iron.**—There is no special change to notice, although the general feeling is of a more hopeful character than it has been for several weeks past. The demand is fair, and at the current rate of production there appears to be very little danger of an over-supply. Southern Iron is the one uncertain factor that the trade have to deal with, and prices in the near future will depend very largely upon the supply from Georgia, Tennessee and Alabama. In point of fact, it is impossible to make anything like safe predictions so long as this problem remains unsolved, although it is likely that it will require some little advance in prices as an inducement for increased shipments in this direction. The general opinion seems to be that, whatever else may happen, prices cannot go lower, but, with so many sources of supply ready to open at the first indication of better prices, it will be almost equally difficult to maintain an advance unless there should be a very unexpected increase in consumption. With these facts in view, there is no special anxiety to discount the future either by buyers or sellers, so that recent transactions have been chiefly to cover early requirements. Some large buyers would be willing to increase their lines if slight inducements were offered them, and in the same way some sellers would enter for long forward delivery at full quoted rates, but neither side is inclined to sacrifice anything to secure a privilege of that kind. On the whole, therefore, the market may be called steady, with a slight tendency toward firmness on favorite brands. There is also less shading done on outside brands, so that \$15.50 @ \$16.50, delivered at tide, are fair quotations for Gray Forge Irons, \$17 for No. 2 and \$18 for No. 1 Foundry, and from that to \$19 for a few specially choice brands.

**Foreign Iron.**—There is nothing doing, and prices are purely nominal at \$19 asked for Bessemer, and \$26 for 20 % Spiegel.

**Muck Bar.**—There is some improvement in the demand, but prices are very irregular. Sales at from \$26.50 to \$27.50, delivered, according to quality.

**Blooms.**—The demand is not important, and prices are very irregular, according to quality. The best makes are quoted at about last week's prices, viz.: Charcoal Blooms at \$52 @ \$53; Run-out Anthracite, \$43 @ \$44; Scrap Blooms, \$35 @ \$36; Northern Ore Blooms, \$35.

**Bar Iron.**—Small lots have been in active demand, but there is still a notable absence of large orders. Consumption is undoubtedly at a very low ebb, but stocks have been reduced to the utmost limit possible, so that current requirements have to be met by frequent purchases. The chances, therefore, are that the demand will show steady improvement, not only because of increasing consumption, but because the tendency will be to stock up a little as prices become firmer. As yet nothing very definite can be said on that score, but manufacturers are keeping a sharp lookout for contingencies of that kind, which are at least among the probabilities of the future. Meanwhile 1.8¢ is quoted for the best Refined Bars, and from that down to 1.6¢ @ 1.7¢ for common and medium grades.

**Plate and Tank Iron.**—Only a very moderate business can be reported in this department, the absence of large orders being the most unsatisfactory feature of the times. Small lots are taken pretty freely, and, if manufacturers had a few large contracts to fill in with between times, prices would probably be much better than they are. As it is, competition is unusually close, and every little order that comes on the market is bid for at prices little, if anything, beyond first cost; hence the low quotations of the past two or three months, which are still about as follows: Ordinary Plate Iron, 2¢; Tank, 2.1¢ @ 2.2¢; Shell, 2.5¢; Flange, 3.5¢; Fire-Box, 4.25¢; Steel Plates, Flange, 3.5¢ @ 3.75¢; Fire-Box, 4.25¢.

**Structural Iron.**—There is very little doing in this department, and but few of the mills have work on hand to last more than two or three weeks if run on full time. New orders are very scarce, although there are inquiries which may lead to business in course of a month or six weeks, but in the meantime the outlook is by no means encouraging. Prices are about 2¢ @ 2½¢ for Angles, 2.1¢ @ 2.15¢ for Bridge Plate, 2.5¢ for Tees, and 3¢ for Beams and Channels.

**Sheet Iron.**—Business continues in much the same condition as previously reported. Small lots command steady prices, but on contracts for large lots, spring and summer delivery, special rates are quoted. Sales are chiefly at the following prices:

Best Refined, Nos. 26, 27 and 28, 3½¢  
Best Refined, Nos. 18 to 25, 3¼¢  
Common, ½¢ less than the above.  
Best Bloom Sheets, Nos. 30 to 32, 3.5¢  
Best Bloom Sheets, Nos. 32 to 35, 4¢  
Best Bloom Sheets, Nos. 16 to 21, 4.5¢  
Blue Annealed, 4.5¢  
Best Bloom, Galvanized, discount, 57½¢  
Second quality, discount, 59½¢  
Common, discount, 62½¢

**Wrought-Iron Pipe.**—The market shows no improvement, and prices are so irregular that they are hardly quotable. Selling prices are frequently much lower than indicated by discounts, which are about as follows: Butt-Welded Black Pipe, 45 %; Butt-Welded Galvanized, 30 @ 35 %; Lap-Welded Black, 60 @ 65 %; Galvanized, 40 @ 45 %; Boiler Tubes, 57½ @ 60 %.

**Steel Rails.**—The market shows no greater activity, although prices are fairly steady. Small lots are taken at from \$28 to \$28.50 at mill, but large buyers show no disposition to place orders, although it is understood that \$27 @ \$27.50 would be accepted for favorable deliveries. Some of the mills are pretty well filled up until about midsummer; others are less favorably situated, and therefore show less firmness on the chance of securing good-sized contracts.

**Old Rails.**—There is some inquiry for Old Rails, but buyers and sellers cannot agree upon prices. Buyers offer \$18 @ \$18.50, delivered in the interior, or about \$17, Philadelphia, which is from 50¢ to 75¢ below sellers' ideas. Several lots are offered for shipment from Southern and Eastern ports, but consumers are not taking large lots, and prefer to buy them delivered at their own works. Latest transactions were at \$18 @ \$18.50, delivered.

**Old Material.**—A fair demand is reported, and, with somewhat limited offerings, prices are firm and in some specialties probably a shade dearer. The following quotations are about a fair average of the market, varying a fraction above or below, according to selection of quality, point of delivery, &c. No. 1 Wrought Scrap, \$17.50 @ \$18; Turnings do., \$13 @ \$14; Old Car Wheels, \$15.50 @ \$16; Old Steel Rails, \$13.50 @ \$16; Fish Plates, \$22; Cast Scrap, \$13.50 @ \$14; do. Turnings, \$9.50 @ \$10.

**Nails.**—The demand has been very heavy, under which the card rate has been advanced to \$2.25 per keg. Carload lots to the trade can be had at \$2.15, but prices are very firm and likely to be well maintained. Steel Nails are held at about \$2.35, with a fair demand.

## Chicago.

Office of The Iron Age, 36 and 38 Clark St., Cor. Lake St., Chicago, February 2, 1885.

**Hardware.**—The demand for the last two weeks of the month was more than the average January trade. Jobbers and travelers complain of the annoying delays of men and goods on the road caused by the severe snow storms, and assert that considerable business has been retarded thereby. But, notwithstanding this interference, they re-

port the market active. Retailers throughout the country are buying quite freely for "sorting up" their stock, the orders covering nearly everything in the Hardware line. Spring goods are moving very slowly, as is also Wagon Material. Carriage Hardware and Wood Stock is in better request, with a steady demand in a small way for Sleigh Materials. Bells, Robes and Blankets have had quite a good run. Prices on all classes of Hardware are reported steady, with indications of advance on some articles that are in sympathy with the Nail market.

**Barb Wire.**—The market has not changed since our last report. Buyers continue to make numerous inquiries on price and prospects for spring delivery, but are not placing many orders. While the market continues to be steady at 4¢ and 5¢ for Painted and Galvanized in small lots, there is considerable apprehension that these figures do not represent the selling price of all manufacturers. Sales in carload lots are reported from ¼¢ to ¾¢ below these figures, sellers claiming that the lowest price was for special lots of an exceptional character. Several houses who supply Plain Wire have withdrawn their quotations on Nos. 12, 12½ and 13, and are asking an advance, which is likely to stiffen the price on Barb Wire before the close of the week.

**Nails.**—The advance on Nails that began three weeks ago resulted so favorably to the maker and seller that they are now being pushed up with as much rapidity as they were reduced during the last six months of 1884. Carload lots are now quoted \$2.25, 2¢, 60 days, and \$2.30 in small lots, an advance of 15¢ since our last report. The mere announcement that Nails had advanced and that buyers would have to pay more for them the longer they waited has greatly increased trade, and the demand is said to be better now than it was previous to the change. The first 5¢ that was added to the price of Nails was the cause of checking the demand for several days, but an additional advance reopened a brisk trade, and at present consumers are offering their orders for delivery from 30 to 90 days more freely than makers or sales agents are willing to accept. Sales are chiefly made for immediate shipment, and booking orders at present quotations for delivery beyond 30 days are very exceptional. Steel Nails are quoted at 5¢ advance on these prices, though we hear very little about them. Wheeling makers have announced as their price for Iron Nails at mill, \$2.25, less 10¢ rebate on carload lots of 240 kegs.

**Ore.**—The Ore market continues sluggish; prices irregular, and selling only on the small-lot system. Rumors are circulated that the Cleveland Ore Company have signified their willingness to accept 50¢ a ton off on last year's prices for contract orders, but the general impression in this market is that these prices will be shaded still further, and that the price of the Republican Ore Company for 1885 will be about \$5.50 on dock at Cleveland for Lake Superior Ores.

**American Pig Iron.**—The past two weeks are said to be off weeks in the Pig-Iron market. For reasons not visible prices have been weaker and sales less active. If expressed opinions and conjectures made a market, trade would be active and prices firm. Consumption of Lake Superior Charcoal Iron is necessarily light at this season. Nos. 1 and 2 are quoted at \$20.50, four months, in carload lots, with No. 3 selling at \$21.50. Coke Irons of the Lake Superior class continue to be firm at \$20 @ \$21, while the Cinder-Mixed range, as before, from \$19 to \$20; Lake Superior and Ohio Mixed are quoted at \$20.50 @ \$21; Ohio Standard Black Band No. 1 at \$21. These prices have not varied in the last three months. Southern No. 1 is still quoted at \$18.50, and in short supply. A number of small sales have been reported on Southern No. 2 at about \$17. This price could be shaded 50¢ a ton on good round lots, as there are some sellers in the market who prefer to shade their prices to losing a sale. Southern Mill Irons have been more active, and numerous sales are reported at prices quotably equal to \$15, Chicago delivery, in lots ranging from 50 to 1000 tons. Low Moor Irons are again seeking this market more freely as the result of being shut out of the Eastern market by the last cut made on Anthracite Irons, and are quoted at about \$21.

**Scotch Iron.**—The demand for Foreign Iron during the week has been very light. Sales agents thus far have made no arrangement for further importation of Foreign Scotch, and are looking forward to its entire extinction in this market, as American Scotch appears to be taking its place.

**Merchant Steel.**—The demand has improved. A number of buyers have been for some time on the point of placing orders on special grades, and some very acceptable sales have been made. Tool Steel has been in good demand. One house reports a single order of from 4 to 5 tons for prompt delivery. The demand on all grades of Steel is better than it has been. Sales agents and makers seem greatly encouraged over the prospect of having a good trade within the next three months. Prices are now reported to be firm and steady at quotations. Fire-Box and Boiler Steels are looking up, sales being more active in small lots. Toe-Calk Steel has been in fair demand, but, if anything, a trifle less during the week than

earlier in the season. We quote as follows for Best Refined from store:

	Per pound
Best Refined Cast Tool Steel	84 @ 85¢
Crucible Cast Machinery Steel	84 @ 85¢
Open-Hearth Machinery	84 @ 85¢
Bessemer Machinery	84 @ 85¢
Open-Hearth Spring Steel	84 @ 85¢
Toe-Calk Steel	84 @ 85¢
Fire-Box and Boiler Steel	84 @ 85¢
Sled Shoe Steel, plain	2.35 @ 2.40
" " curved	2.35 @ 2.40
Syndicate Steel	84 @ 85¢

**Steel Rails.**—Makers of Steel Rails report that the demand is exceedingly light, and that buyers are not willing to meet prices quoted by Western mills. The quotation from mill continues to be \$29 @ \$30, but rumors are current through brokers that these prices are not firm and could be shaded from 50¢ to \$1 per ton. The North Chicago Mill, which was in operation for a week, had to close down for want of fuel, which was delayed on the road by the cold weather and snow storms. They expect to receive about 100 cars of Coal and Coke in a few days, when the works will be again started. They are receiving orders only for small lots of Rails, and are inclined to the belief that prices are pretty well settled, and that the greater portion of the business for this year has been placed.

**Old Rails.**—With the starting up of the Bar-Iron mills there seems to be more demand for Old Rails, and holders are now asking \$18.50 as bottom figures. Buyers are still confident that Rails are not worth this money and are offering \$17.50, but it is doubtful whether they will be able to secure any quantity at this price. On a special lot of 1000 tons sold recently it is reported that \$18.50 was realized.

**Structural Iron.**—Activity in building operations has not commenced as yet, and the market for Structural Iron remains rather quiet under the circumstances. Numerous structures that are in contemplation, and upon which specifications for the Iron-work had been sent out, are temporarily suspended. Trade from store cannot be looked upon as worthy of any mention. We continue to make the following quotations: Beams, \$3.60; Channels, \$3.60; T Iron, \$3; Angle Iron, \$2.50; Flitch Plates, \$2.50; Frieze Plates, \$2.70; ¼¢ @ ½¢ is added for delivery from stock.

**Bar Iron.**—The conditions of the Bar-Iron market appear to coincide with that of the Nail market, but Refined New Puddled Iron is still quoted at \$1.50 rates from store. The firmness displayed by makers and sales agents has stimulated trade, and orders are reported as coming in more freely and in larger quantities than usual. One of the important features in the market is the fact that Common Iron has advanced to the same price as Best Refined, and sales agents decline to sell at less than these prices. On all inquiries quotations are made for immediate delivery only. Where manufacturers are willing to state a price beyond this, they hold the privilege of withdrawing quotations at their pleasure. Mill quotations for carload lots for Best Refined is \$1.70 @ \$1.75, and on Common Iron, \$1.60, an advance on the latter of 10¢ within the week. The firmness of the price on Common Iron is questioned.

**Norway Bars.**—Trade in Foreign Bars is rather quiet at \$3.75 to merchant trade in carload lots, and at \$4 rates to local trade.

**Galvanized Iron.**—There is nothing new to report in connection with this class of Iron. There still remain some anxious sellers in the market, who have increased their discount 5 % on previous sales for the purpose of getting off an odd lot of Iron that had accumulated during the last six weeks. Considerable inquiry is made by various jobbers with the hope of picking up some favorable lots, but nothing definite has thus far occurred. We continue the following quotations as jobbers' price from store: Juniata, 57 % discount. Charcoal, 60 % discount, and Refined, 62½ % discount from list.

**Black Sheets.**—The market has been more active during the week, and some sales of the heavier grades have been made at figures slightly in advance. For Best Refined grades from store we continue our last quotations.

**Old Wheels.**—The market for Old Wheels remains about where it was at our last report. Holders are still asking about \$16. For a lot of 500 tons \$15.50 was realized by brokers, and it is possible that this is a pretty fair showing of what the market price would be on small lots. Foundrymen are making open bids of \$14.50 on quantities and \$15 on special grades, but holders seem to be very strong and will make no concessions.

**Scrap Iron.**—There seems to be a stronger market at present. Mill price on No. 1 Mill Scrap is now \$15, and \$10 on No. 2, Milwaukee delivery, which is an advance for the two weeks of about \$1 per ton. No. 1 Forge is held firm by dealers at \$17; demand lighter than for the other grades. Stocks are coming rather slowly. We continue our last quotations for dealers' purchasing prices.

EVERETT & POST, 156 Lake street, Chicago, report to us as follows, under date of February 2, 1885: **Pig Lead.**—The same dullness and apathy exist as we outlined in our last circular, and the month just closing has been a disappointment to most manufacturers. The market may be quoted at 3½¢ for spot and February delivery, but we find no refiners willing to sell ahead more than 30 days. In New York the transactions have been very limited, though the market continues at 3.65¢ for Common and 3.7¢ for







# Trade Report.

## General Hardware.

We are glad to be able to record a somewhat improved condition in the market. The volume of business is larger than at our last report. Travelers are sending home some orders. The large trade are in some cases purchasing more freely than heretofore, with the impression that some lines of goods have about touched bottom. Inquiries are more frequent, and, even though regarded as efforts to get at low prices as possible, they indicate an inclination toward trade. In addition to these encouraging signs there appears to be a better feeling, and merchants are considering whether or not the time has come to buy such goods as they require. The advance in Nails has had a good effect on the market, and if other leading lines were to move in the same direction it would aid in giving a stronger tone to Hardware generally. But, while there are these indications of improvement, the amount of business actually transacted is not very materially increased, and most of the orders received are for small assortments and immediate needs. The financial outlook is unchanged. Collections are fair, though not easy.

In this connection we take pleasure in laying before our readers the following extract from a communication which we have received from an experienced Hardware man, who has opportunities for observing the condition of trade in this State, and our readers will be pleased to observe the somewhat hopeful view which he takes of the outlook. On this point he says:

I have been in the principal towns of this State during the past two weeks, giving close attention to the condition of trade and the indications for the future, consulting many of the most experienced and conservative merchants. While two weeks ago there did not seem to be much to encourage, I find within the last few days a much more hopeful opinion expressed. The starting up of foundries, Agricultural Implement manufacturing and other important industries seems quite general. Locomotive shops, Carshops, Firearm establishments, &c., are reported as receiving orders sufficient to put the wheels in motion. The recent advance in Nails has had a very encouraging effect, as indicative of what may happen with other leading goods. Hardware dealers are, in fact, inquiring whether prices have not actually touched bottom, and whether it is not a good time to make purchases. Of course there are now, as always, many croakers, but the hopeful ones are largely in the majority.

### BARB WIRE.

Our local market has remained quiet, the volume of business being of fair dimensions only. It is noted, however, that orders of fair lots come from comparatively small towns, indicating that the consumption in the East is coming from a larger territory and from new quarters. It is stated that the Eastern demand is beginning to exhibit that rapid growth which has formerly characterized Western markets. There was a meeting of licensed Barb-Wire manufacturers in Chicago on the 3d, and a second meeting of both licensed and unlicensed manufacturers is now progressing at St. Louis. It is understood that an effort is to be made to increase prices, and it is urged in behalf of that action that stocks in the hands of dealers are reported to be generally small, and that the spring has always in the past witnessed a hardening of values. Buyers, on the other hand, are inclined to be skeptical, since the many rumors of similar action during the past winter have not led to advances. We continue to quote small lots of Four-Point Galvanized Barb Wire at 5 to 5 1/4 cents, delivered in New York City, and Painted Four-Point Wire, 4 to 4 1/4 cents.

### NAILS.

Nails continue firm at the advance established last Friday; there has been an active demand at the prevailing rate of \$2.15 in carload lots, and the market is in a healthy condition for the present. There are inquiries for future delivery, but there is a disposition to avoid selling beyond 30 days. The applications made for Tenpenny Nails would seem to indicate that there is a scarcity of that size in some quarters. Some makers are having all they can do to clear away old orders, and there is a general disposition to regard the immediate future with confidence. Steel Nails are quiet at prices 10 cents above Iron Nails. The Bellaire Works are temporarily out of the market. The works are idle on account of labor troubles. The other works are running.

### CAST BUTTS.

A meeting of the manufacturers of Cast Butts was held in this city to-day, most of the principal manufacturers being present or represented. The price of these goods, as the trade are aware, has for some time been irregular, and this meeting was for the purpose of conference as to the feasibility of establishing more uniformity in price. After a full discussion of the situation, the following discounts were adopted:

Narrow and Broad, Fast Joint	dis 60x10
Narrow and Broad, Loose Joint	" 70x10
Parliament and Mayer's	" 70x10
Loose Joint, Japanned	" 70x10
Loose Pin, Japanned	" 70x10

### CATALOGUES, ETC.

Harrington & Richardson, Worcester, Mass., in their descriptive price list illustrate fully their Hammerless, or, rather, Internal Hammer, Gun, which is shown in their advertisement on page 39. Its construction is plainly indicated, and the advantages which

its possesses are enumerated. Among these are mentioned its safety from accidental discharge; the convenience and rapidity with which it may be loaded and discharged; the simplicity of the lock action; the ease with which the locks can be oiled; the quality of material, workmanship and finish, &c., but for further information we must refer our readers to the catalogue.

The Dille & McGuire Mfg. Co., Richmond, Ind., have issued their catalogue of Lawn Mowers for the coming season, the first that we have thus far received. The pamphlet is occupied with a description of the different styles of Mowers that they make, and with testimonials from parties who have used them. They direct special attention to their new style "C" Richmond Star Lawn Mower for 1885. In presenting this Mower they state that every point essential to a perfect machine has been carefully looked after. It is so constructed that when in operation the cut grass is thrown to the rear and left of the Mower and out of the way. They mention that they have dropped the cross-rod holding the two sides of the machine together, 3/4 inch lower than in last year's Mower. They have also added the bracket cross-handle, but for further points in this machine we shall have to refer our readers to the catalogue.

Prewitt, Spurr & Co., Nashville, Tenn., issue a price list, January, 1885, of the Red Cedar, Ash and Oak Wooden-Ware which they manufacture. It covers a line of Pails or Buckets, Water Cans, Churns, Well Buckets, &c., as well as other goods which may be of interest to some of our readers.

The Chicago Spring Butt Company have issued their list for the present year, illustrating their Patent Spring Butts, a description of one of which is given among Hardware Novelties, on page 37. Brainard & Co. are the Eastern agents and have an office at 125 Chambers street, in this city, where they will carry a stock of these goods for the convenience of the trade.

The price list of the Medina Mfg. Co., Samson & Sweet, proprietors, Medina, N. Y., has been issued for the current year, and illustrates the variety of Door Hangers, Rail, Stay Rollers, &c., of which they are the manufacturers. It also covers Wagon Shoes, Swage Blocks, Tuvier Irons and other goods. The trade will be interested in observing the additions which have been made since the issue of their former list. Attention is especially directed to the Hamilton Patent Wrought Iron Door Hanger, concerning which they make the point that it cannot run off the track; that the flange keeps it from binding and prevents friction, while the wrought strap, corrugated, makes it stiff and not liable to break or bend. The list as a whole is interesting on account of the varied line of Door Hangers represented.

The E. D. Clapp Mfg. Co., Auburn, N. Y., have issued their catalogue for 1885, which is a handsomely printed pamphlet of nearly 200 pages, considerably larger than their last issue, and comprising a good many new goods, some of which are novelties. It covers a very extensive line of Carriage Hardware, Forged, Malleable and Miscellaneous, in the exhibit of which it is exceptionally complete. Among the leading goods represented in it are Shaft Couplings, Fifth Wheels, Step Pads, King Bolts, Perch and Bed Plates, Clips, Stump Joints, Shifting Rails, Gear Irons, Top Props, Slat Irons, and a large variety of Malleable Castings, and other articles in great number for use in carriage building, for more definite information concerning which we must refer the trade to the catalogue. The company mention that, in addition to the complete line of Carriage Hardware represented, they have a full assortment of Carriage Trimmings, including Enameled and Patent Leathers, Broad Cloths, Oil Cloths, Hair Mats, &c., and a full stock of Woodwork of every description, and of Varnishes, Coach Colors, Transfer Ornaments, &c., on which they are prepared to give the lowest market rates. The index is very full and satisfactory, and gives an idea of the extent of the manufactures of this house, whose catalogue will be studied with much interest by the trade.

We are in receipt of a small pamphlet published by Nash & Bros., Middletown, N. J., about Harrows—"What they were, what they are, and what they should be." In it an interesting history is given of Harrows, from the earlier to the later styles, concluding, we need scarcely remind our readers, with the "Acme," which is made by the enterprising house which publishes the pamphlet.

The Chamberlain Plow Company, Dubuque, Iowa, have issued a new catalogue of the Plows, Cultivators, Harrows, Road Scrapers, &c., of which they are the manufacturers. As among their most recent additions they refer to their General-Purpose and Timberland Plows, Tongueless Cultivator, Dubuque City Feed Cutters, New York Champion Sulky Rake and Hamilton Corn Planter. They advise us that all the metal beams in their Plows are made with their new patent steel beams, which are tempered and claimed to afford the best forms now in use for this purpose. They also state the mold-boards of all their Plows are made of iron-backed steel, made expressly for their use, and tempered glass hard, for which they have adopted "Crystal Steel" as a trade-mark. They announce also a reduction in the price of Julien Churns of 50 per cent. off old list.

Emmick & Hatcher, Columbus, Ohio, have issued a new price list, bearing date,

1885, of the Columbus Wrought Steel Wagon Skein, which is so widely known. The list is conveniently arranged and well printed, and will be of interest to the trade.

The Scranton Mfg. Co., Chicago, Ill., for whom Brainard & Co. are agents, 125 Chambers street, New York, issue their catalogue, bearing date January 1, 1885, in which they exhibit their line of Hangers and also their Automatic Hinges and Combination Latches. In their introductory remarks they mention that they have recently made a number of additions and improvements in their Hangers, and refer to the increasing demand for these goods. They direct special attention to their Double Hangers for large or heavy doors, making the point that the simple anti-friction principle covered by their patents enables them to furnish these goods at specially attractive prices.

The Batavia Clamp Company, Batavia, N. Y., are manufacturers of Clamps, Saw Handles, Saw Sets, Bolt Sets, Thill Couplers, Wagon Jacks, &c., which they fully illustrate in a neat catalogue. In it are some new goods, one of which, their Lifting Jack, is illustrated among the Hardware Novelties on page 37.

Thomas Laughlin & Son, Portland, Me., manufacturers of Tackle Blocks in large variety, and also of a line of Marine Hardware, including such goods as Thimbles, Tackle Hooks and Thimbles, Sister Hooks and Thimbles, Anchor and Chain Shackles, Belaying Pins, Wood and Iron Cleats and Chocks, Boat Hooks, Gaff Top-Sail Hooks, and Jib Hanks, Anchors, &c. Their Blocks they offer to the trade at a discount of 50 and 10 per cent.

Mast, Foss & Co., Springfield, Ohio, issue a catalogue of the Buckeye Wrought-Iron Fencing, in which they exhibit the principal styles to which they desire to direct the attention of the trade. In their preface they refer especially to the manner of constructing their Fences, and mention the principal points of superiority on which they would lay emphasis. This catalogue is uniform in size and style with others which we have recently noticed. It includes also the Buckeye Force Pumps, and the Buckeye Lawn Mowers, Junior and Senior, and the Buckeye Hose Reel and Lawn Sprinkler.

The Custer Beam Works, Philadelphia, have issued their catalogue, bearing date January 1, 1885, in which they illustrate, with prices, the line of Scale Beams of which they are the well-known manufacturers. They refer in their introductory remarks to theirs as the most complete list of Scale Beams in the world, manufacturing as they do nothing else, and having the benefit of a long experience. They direct special attention to the Beams stamped with their own name, "Custer," as being made of one piece of metal, with steel pivots and warranted strictly accurate. They allude to the price as not exorbitant, and state that, notwithstanding the demand for low-priced goods, these are found desirable for merchants to handle. Custer's Patent Balance, a new article, is described as having enormous capacity, and is made in three sizes—from 2 to 300 pounds, from 2 to 600 pounds and from 2 to 1200 pounds. The manufacturers state that it is not half the size of the regular Beam, and weighing, as it does, with a 2 pound poise, instead of one weighing 16 or 32 pounds, it saves much labor and time. They also make as a second quality of the above a Keystone Patent Balance which is made in sizes of the same capacity.

The Rock Island Plow Company, of Rock Island, Ill., issue circulars for the following machines for the present year: The Buford Spring Cultivator, the Buford Combined Riding and Walking Cultivator, the Buford Tongueless Cultivator, and the Buford Wheel Landside Sulky.

Gaar, Clawson & Co., Richmond, Ind., in a tasty circular call the attention of the trade to the "Hoosier" Roller Skate, the principal merits of which are succinctly specified.

The E. Jencks Mfg. Co., Pawtucket, R. I., for whom Samuel A. Haines is agent, 88 Chambers street, New York, have issued their price list, bearing date January, 1885. It covers a line of Bright Wire Goods, Spring Pins or Cotter, Flat Spring Keys and Hicks's Improved Pointed Bolt Hooks. The lists of these goods are those with which the trade are familiar, with the exception of that for Spring Pins or Cotter, which has been revised, most of the changes, however, being of minor importance.

F. K. Sibley, of Waltham, Mass., in his price list calls the attention of the trade to the Emery, Crocus, Corundum, Adamanta and Tripoli Cloth which he manufactures. Mr. Sibley is known as one of the earliest manufacturers of this line of goods, and is now making them for a number of leading dealers. His list also covers Corundum, Emery, Crocus and Tripoli, and Corundum and Emery Cement.

The R. R. Rouse Mfg. Co., of Indianapolis, Ind., have recently commenced the manufacture of a new 6-inch Double-Head Wrench for use on sewing machines, bicycles, &c., made, it is said, at the request of certain large dealers of this city. They have just added new machinery and otherwise increased their facilities, expecting, as soon as the weather will permit, to build an addition to their factory.

The revised list and catalogue of A. W. Crossman & Son, West Warren, Mass., gives in convenient form the list prices and discounts on their Chisels, Gouges, Drawing

Knives, &c. From this list it is seen that they are making a very complete line of these goods, and in their preface they allude to their 34 years' experience in manufacturing Edge Tools as enabling them intelligently to meet the requirements of the trade, and add that they have now better facilities than ever before for producing goods.

### THE ENGLISH MANUFACTURERS AND MERCHANTS.

The following communication appeared in a recent issue of the *Ironmonger*, and was called out, as our readers will perceive, by remarks in that journal, to which we have already directed attention, on the question of English Axes in Australia. This letter will be interesting to our readers, not merely as bearing on the question of American Axes in Australia, but also as throwing some light on the relations between the English manufacturers and the merchants, and giving some indications of the perplexities connected with their methods of doing business. It will suggest unsettled questions in the American Hardware trade as to the extent to which it is wise for the manufacturer to confine his trade to the jobbers. Referring to what he terms the want of reciprocity between the merchant and the manufacturer, the writer goes on to say:

It has always been the fashion to blame the English manufacturer for obstinacy in adhering to certain shapes, patterns, &c., but, in my opinion, this is most unjust. The bulk of manufacturers care not whether they make an article of one pattern, style and finish or another, so long as the quality required of them is up to their reputation and they can find a market for their goods when made. But the question is, How are they to know the exact thing required for a particular market? They are either entirely dependent upon the merchant for full information, or they must have direct communication themselves. If the manufacturer waits for information from the merchant, it is my experience (and, as a member of one of the oldest firms of Edge-Tool-makers in the country, I speak with some authority), he may wait until doomsday. If, on the other hand, he has direct communication, the merchants are bitter against him, and say he is going in for direct trade, and that they will not ship more of his goods than they can help. It is my opinion that, unless the merchants stir themselves to give manufacturers what information they can, they will drive manufacturers to just what they don't wish, viz., direct trade. Manufacturers cannot afford to have colonial and foreign representatives unless they do an increased trade or obtain better prices by saving the merchant's commission.

My firm manufacture a certain article largely for Australia, but our sales of it have only kept up because the demand is now so much greater than formerly. To make this article a thorough good tool for the market it was necessary that a slight alteration in a portion of it should be made. How easy for merchants to give us this information! If they had, our trade for it would now be treble what it is. But not a bit of it; although we had dealt with many of them for years and years they passed us by without saying a word. It remained for an anonymous writer, who signed himself "Anglo-Australian," to give us the hint, and, although this happened some few years ago, I am glad to have this opportunity of publicly thanking him. Merchants are too apt to think the favor is all on their side; but not a bit of it. We give them good value for their money, and, in these cutting times, much too good value in many instances. If merchants would make it their business to give the manufacturer all the information they can, you may rely upon it manufacturers would not be slow to act on it, and we should not hear so much about this and that trade leaving the country. Merchants and manufacturers should, so to speak, work together. What is good for one should be for the other.

### CREDITS ON THRESHER GOODS.

The convention of Thresher manufacturers, held in Chicago last November, was largely attended, and nearly all of the more prominent manufacturers were present or represented. The object of the convention was especially to devise ways and means by which the sale of this class of goods could be effected on some more satisfactory basis, principally with reference to the length of credit given on sales of these goods, and to obtain a better and more secure class of paper for them. Many questions were discussed, and the following resolutions were finally adopted as embodying the matters upon which the convention could agree:

1. Resolved, That we will make the extreme terms upon which we will sell Threshers and Engines as follows: Two-fifths of the price not later than January 1 following the sale, two-fifths not later than the 1st of the second January following the sale, and one-fifth not later than the 1st of the third January following the sale, it being recommended that the amount of each sale be divided into five equal notes.
2. Resolved, That all commissions to agents shall be paid *pro rata* from the proceeds of each sale, the gross proceeds to be forwarded to the manufacturer and the commissions returned to the agent as collected.
3. Resolved, That the manufacturers of Threshers and Engines require their agents to guarantee the payment of all notes maturing after the second January following the sale within 90 days after maturity.
4. Resolved, That we will not allow any of our agents to deliver any Thresher or Engine to any purchaser until full settlement for such machine is made. Any agent violating this provision shall be held personally liable for the property so delivered.
5. Resolved, That we do not deem it advisable to materially change the present list prices of Thresher Goods.

Nearly all the manufacturers subscribed to these resolutions, but in some few instances Nos. 2 and 3 have not been fully subscribed to, the manufacturers referred to not binding themselves to put them in force in all

cases, but promising to do so to as great an extent as they find feasible without injuring long-established business relations with old agents. We are advised that the manufacturers generally are determined to put the substance of these resolutions into force in their business, and it is intimated that many of them will be even more strict than required by the resolutions, with reference to the time and security of their sales. They appear to realize that the way in which this business has heretofore been done has been altogether too slack, and that, as a consequence, it has not been as profitable as it should be. Those who are familiar with the way in which this branch of business has been carried on, and the very long credits that have been given, will recognize the necessity for this action, and wish the manufacturers success in this effort.

### ITEMS.

Our readers will observe on page 20 the striking advertisement of Samuel A. Haines, 88 Chambers street, New York. It will be especially interesting to our readers as giving the list of the houses who are represented by him, and also as an evidence of the enterprise and energy which, coupled with his wide acquaintance, enabled Mr. Haines, in the short time that he has been building up his present business, to secure so many important agencies, most of which are from prominent manufacturers of leading lines.

D. S. Jenkins, of Brockton, Mass., one of the manufacturers of Tacks, Brads and similar articles who is not connected with the Tack Manufacturers' Association, makes an announcement which will be of interest to Hardware dealers. His concern, being unchecked by association prices, is offering goods at discount 50 per cent. from the Tack list. At his manufactory at Brockton he is reported to be running 40 machines, and has made preparations for making a full line of goods.

We hear from a number of manufacturers and merchants complaining of the lack of trade usual at this season, but from a well-known Hardware commission merchant we are glad to have the satisfactory report which is given in the following communication:

There is evidence of a very decided improvement in the demand for Hardware from the large buyers. So many liberal orders have been placed during the past month that some manufacturers are compelled to decline new ones where prompt shipment is required. All signs indicate that the lowest prices have been reached for General Hardware, with strong probabilities of conservative advances all along the line.

The directors of the Hardware Board of Trade, of this city, have appointed Ernst Hilger, the president of the board, to represent them at Washington, with other committees representing other boards and industries, for the purpose of urging upon Congress the immediate passage of a national bankruptcy law.

Ely & Wray, importers of Cutlery and sole agents for William T. Staniforth, have removed from 74 Reade street to 16 Warren street, in this city.

The E. T. Luffkin Rule Mfg. Co., Cleveland, Ohio, call attention in a circular to the exhibit of their goods at the World's Industrial Exposition, at New Orleans, where they are represented by F. S. Bigler. Their location is in the southwest corner of the main building, posts C and CC, 1 and 2, near the door leading to the sawmills.

Eaton & Holmes have commenced the manufacture of Tacks at Bridgewater, Mass., where they are said to be running five Tack machines.

From the description given in one of our exchanges it may be inferred that the display to be made by the Champion Roller Skate and Wagon Company, Richmond, Ind., of their "Star" Roller Skate, at the exposition at New Orleans, is to be one of the finest in the line. Club Skates are spoken of as shown in gold, silver, nickel and bronze, with wheels of mahogany, cherry, boxwood, rosewood, ebony, lignumvite, &c. The straps are made of alligator, lined with fancy silks. The wood-bottom specimens are described as highly polished and finished, and made of various choice woods. The Northwestern Hardware Company, 101 Reade street, New York, and Chicago, Ill., have, it will be remembered, the sale of these Skates, and the sales last week are reported to have amounted to 10,000 pairs.

The Corundum Knife Sharpener, made by the Union Stone Company, 33 and 40 Hawley street, Boston, and described among our Hardware Novelties, on page 37, is intended to retail at 25 cents. The price by the dozen, as announced in the manufacturers' circular, is \$1.50, and by the gross \$18.

Among the Special Notices, on page 26, will be found one in which a Wire house advertises for a traveling salesman for Southern trade. It will be requisite that he be willing to make extended trips, and desirable if he can have also some familiarity with the trade. We may add that the parties advertising are a well-known concern, and that the opening is worthy the attention of those desiring such a connection.

C. M. Miller, Canton, Ohio, announces to the trade that he has made arrangements by which he is prepared to furnish the Torrent and Unique Steam Pumps, the Miller Roller Mill, and General Flour Mill Supplies. He mentions also that he will be able to furnish the Ohio Farm Church and School Bell by March 1.



The Kelsey Mfg. Co., of Syracuse, N. Y., are the assignees of the patent right in a new pipe coupling. The coupling is provided with a valve in both of the pipes. These valves are automatically kept open as long as the pipes are connected, but they are closed as soon as the pipes are separated. In this way the use of stop-cocks near the couplings is avoided. The coupling consists of an ordinary duplex coupling case, embraced by the usual nut. Each case is provided on the end nearest the pipe with a valve port, forming the seat for a puppet-valve. This valve is connected to a foot or yoke, and the yokes of the two valves are of such a length that, when the coupling is drawn together, they meet each other and push the valves off their seats. In disconnecting the coupling the yokes are relieved from their end bearings and the valves are forced upon their seats by spiral springs.



**L. COES'**  
Genuine and Mechanics,  
**PATENT**  
**Screw Wrenches**  
MANUFACTURED BY  
**L. COES & CO.,**  
Worcester, Mass.  
ESTABLISHED IN 1839.




Our Genuine Wrenches are made with straight bars, full width and enlarged jaw, having ribs cast inside, which strengthen the jaw and give a full bearing on front of bar. These improvements, in combination with our new ferrule, made with double bearings, an iron tube, fitted to the shank and resting against the lower bearings, rigidly hold in position by the handle and nut, effectually preventing back thrust of ferrule (see sectional view), verify our claim that we manufacture the heaviest and strongest Wrench in the market. None genuine unless stamped.

**L. COES & CO.,**  
Worcester, Mass.  
Warehouse,  
97 Chambers and 81 Reade Sts.  
NEW YORK.  
**DURRIE & McCARTY,**  
Sole Agents.

**NIMICK & BRITTAN MFG. CO.,**  
PITTSBURGH, PA.,  
**BUILDERS' FINE HARDWARE,**  
RIM AND MORTISE DOOR LOCKS WITH  
**BURGLAR-PROOF ATTACHMENT.**  
GENUINE BRONZE AND IMITATION BRONZE KNOBS, &c., &c.  
Mathes' Patent Burglar-Proof Sash Locks.  
**PADLOCKS.**  
TEA, COUNTER, UNION AND PLATFORM SCALES.  
Catalogues and Lists furnished on application.  
**JOHN H. GRAHAM & CO., Agents, 113 Chambers St., New York.**

**COPYING PRESSES**  
MANUFACTURED BY THE  
**ILLINOIS IRON AND BOLT CO.,**  
20 to 26 Main St., CARPENTERSVILLE, KANE CO., ILL.

ILLUSTRATED CATALOGUE AND DIS-  
COUNT SENT TO THE TRADE  
UPON APPLICATION.



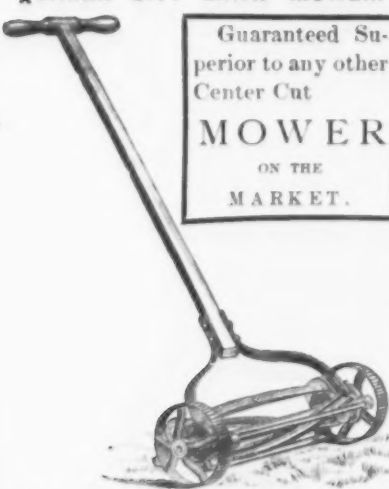
Railroad Way-Bill Copying Press.

Finished in Black and Carmine, with Bronze Ornamentation.

ALSO MANUFACTURERS OF

Blacksmiths' Tools, Jack Screws, Thimble  
Skeins, Sad Irons, &c.

**QUAKER CITY LAWN MOWER.**



Guaranteed Su-  
perior to any other  
Center Cut  
**MOWER**  
ON THE  
MARKET.

Has no Equal, Sur-  
passing all others,  
and pronounced  
"THE BEST."

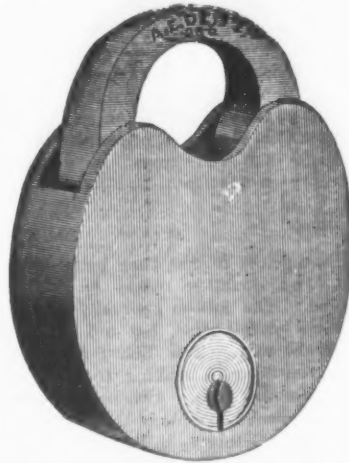
THE QUAKER CITY Reduced in Price.  
Now, why buy a worthless mower?  
SEND FOR LIST.  
**Lloyd & Supplee Hdw. Co.,**  
Philadelphia.  
**DURRIE & McCARTY, New York.**



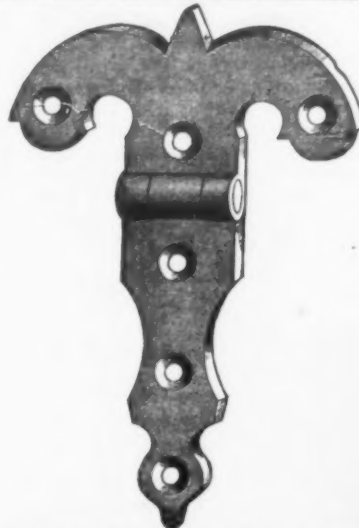
**1885.**  
**PENNSYLVANIA**  
**LAWN MOWER.**

New Price Lists will be ready about February 10th. Please write for same to  
**LOYD & SUPPLEE HARDWARE CO., Phila-  
delphia.**  
**DURRIE & McCARTY, New York.**  
**AMES FLOW CO., Boston, Mass.**  
**PRATT & CO., Buffalo, N. Y.**  
**SIMMONS HARDWARE CO., St. Louis, Mo.**  
**HAMILTON & MATHEWS, Rochester, N. Y.**  
**MARKLEY, ALLING & CO., Chicago, Ill.**  
**R. A. CULTER & CO., Peoria, Ill.**  
**BUHL RONS & CO., Detroit, Mich.**  
**LAYMAN, CAREY & CO., Indianapolis, Ind.**  
**LOCKWOOD, TAYLOR & CO., Cleveland, Ohio.**  
**WM. FRANKFURTH & CO., Milwaukee, Wis.**  
**WALTER S. LUDLOW, Cincinnati, Ohio.**  
**THE TODD-DONIGAN IRON CO., Louisville, Ky.**

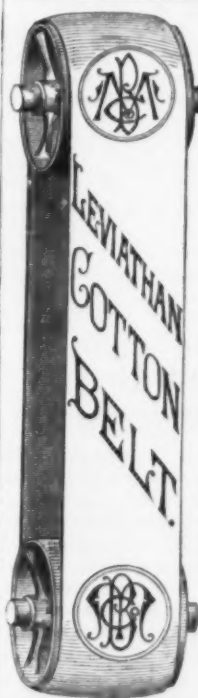
**A. E. DEITZ. BARBER'S BIT BRACES.**



**DURRIE & McCARTY, Agents,**  
97 Chambers & 81 Reade Sts., New York.



**CAST BRASS HARDWARE**  
FOR  
**ICE HOUSES AND**  
**REFRIGERATORS**  
Manufactured and kept in stock by  
**W. & J. TIEBOUT,**  
Manufacturers of  
**BRASS, GALVANIZED & SHIP CHANDLERY**  
**HARDWARE,**  
Nos. 16 & 18 Chambers St.,  
NEW YORK.

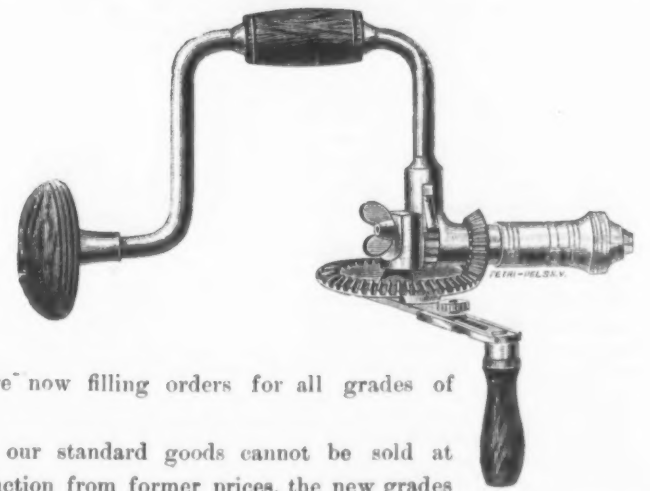


ALWAYS GIVES THE  
UTMOST SATISFACTION.

**Main Belting Co.,**  
Manufacturers of  
**THE LEVIATHAN**  
**COTTON**

**BELTING.**  
Unsurpassed for  
Strength, Durability and  
Cheapness.  
Made to any Length,  
Width and Strength.  
Main Driving Belts.  
Guaranteed to Run  
Straight, Even Through  
out.  
No Cross Joints, Un-  
affected by Damp.  
Clings well to the Pulley.  
Has no equal. In fact,  
is THE BELT.

**MAIN BELTING**  
**COMPANY,**  
S. W. cor. Ninth and Reed  
Sts., Philadelphia.  
Also  
248 East Randolph St.,  
CHICAGO.



We are now filling orders for all grades of  
Braces.

While our standard goods cannot be sold at  
much reduction from former prices, the new grades  
will be offered at market rates for goods of like quality. Our Braces  
are still covered by six good and valid patents, which have several  
years to run. Quotations on our full line will be furnished on request.

**MILLERS FALLS CO.,**

No. 74 CHAMBERS ST., NEW YORK.

**CHAMPLAIN**  
Forged Horse Nails.  
MANUFACTURED BY THE  
**NATIONAL HORSE NAIL CO.,**  
Vergennes, Vermont.  
HOT FORGED AND COLD HAMMERED POINTED. MADE OF BEST  
NORWAY IRON AND WARRANTED.  
WAREHOUSE  
97 CHAMBERS AND 81 READE STREETS NEW YORK.  
**DURRIE & McCARTY, Sole Agents.**

**THE SEIDEL & HASTINGS CO.,**  
WILMINGTON, DELAWARE,  
New York Office, No. 90 John St.; Entrance on Gold St.,  
MANUFACTURERS OF

**BEST CHARCOAL**  
**BOILER PLATES,**  
AND PLATE IRON GENERALLY.  
ALSO BEST QUALITY HOMOGENEOUS STEEL PLATES.

We ask the special attention of the trade to our C. H. No. 1 Boiler Plates, which we  
manufacture expressly for the Shells of Steam Boilers and stamp 50,000 pounds T. S. when  
desired. One hundred and sixteen tests of this iron, made during the last three years by the  
U. S. Inspectors of Steam Vessels, show an average tensile strength of 58,508  
pounds to the sectional square inch, and an average reduction of area of the fractured  
section of 30% per centum. Our prices are as low as the production of a good article will admit of.



**VARIETY IRON WORKS.**

**ALFRED C. REX & CO.,**  
Manufacturers of

**PATENTED HARDWARE SPECIALTIES AND NOVELTIES.**

MAIN OFFICE AND FACTORY:  
**FRANKFORD, PHILA.**  
BRANCH OFFICES:  
126 Chambers St., New York, Chas. E. Spier, Mgr.  
and 415 Commerce St., Phila.  
New Spring Specialties—King Egg Beaters, awarded medal at American Institute, New  
York; King Candle Lamp and Lantern, cheapest combination ever made.



**DAY BROS.'**

**PORTABLE FORGES.**

Fan Blowers, Tire Benders, etc.

All sizes. The most improved and handiest.  
Blacksmiths' Machines of all sorts.  
Send for full particulars.

419 & 421 N. 2d St., PHILADELPHIA, PA.

**PURE TURKISH EMERY.**  
**WALPOLE EMERY MILLS**  
South Walpole, Mass.



## English Letter.

(From Our Regular Correspondent.)

LONDON, January 19, 1885.

## THE WEEK

has been a very quiet one, on the whole, and the general state of business has remained unchanged, subject to the minor variations which will be found mentioned in subsequent portions of this letter. Toward the close of the week some consternation was caused by the receipt of long cablegrams respecting the suspension of Oliver & Phillips, of Pittsburgh, and of a New York bank. These occurrences dissipated the fond hopes of those who had fancied that an improvement had set in among certain departments of the American iron trade, especially as the cablegrams to hand on this side allude to a gloomy outlook with you, coupled with the expectation of further failures. Had Messrs. Oliver & Phillips been a small concern the news would not have been accorded so much attention, but they are so well known as being a leading house that the supposition is that matters are really bad with you. Certainly things are sufficiently dull here, for trade is shockingly quiet, and there is a steady growth of the number of unemployed. Even concerns like Tangye Bros., of Birmingham, are feeling the pressure of the times and have just had to discharge several hundred men. The demonstration of workmen at Birmingham attracted great notice last week, and opened the eyes of the easy-going persons who flatter themselves that the depression of trade is slight or temporary. In London there was also a demonstration on January 17, when Mr. Henry George was present and brought forward his land-robbing nostrum, all oblivious of the fact that at this moment there are hundreds of thousands of acres of good English land which can neither be sold nor let, not to say given away, at any price.

Your contemporary, the *Ironmonger*, is agitating the question of a standard quality of steel rails, or rather, as I understand its remarks, the adoption of a uniform specification and tests for all grades and sections of rails. If I remember rightly, something of this kind was advocated by Sir (then Mr.) Henry Bessemer, when president of the Iron and Steel Institute, in 1871, but nothing came of his suggestions. At the same time your contemporary is doubtless on the right track and deserves a successful issue for its agitation, although the conflicting views and interests of the engineers on the one hand, and the rail manufacturers on the other side, render any such compromise unlikely. Speaking of the rail manufacturers reminds me that the association of that ilk held its annual meeting in London on January 15, when the annual report and such speeches as have been permitted to transpire were all replete with hue and gratulatory of tone. The combination was said to have worked well, and the prices fixed from time to time were only such as allowed the business to be carried on at a living profit. A piece of plate was presented to the president (Mr. Josiah T. Smith, of Barrow) in recognition of his services to the association. To all this I may add that for some extraordinary reason another meeting of the members was held two days afterward, on January 17, at Paris, when it was decided to allow the present prices to remain in force for the next three months. You will remember that the whole of the rail manufactures of this country, with one exception, are members of the combination. That exception is Steel, Tozer & Hampton, of Sheffield, who declined to enter, and are still fighting for their own brand. Recently the North-Eastern Railway Company required a large quantity of rails, say 70,000 tons, delivered at Doncaster. Tenders were put in by the association and by Steel, Tozer & Hampton, the prices of the latter being so arranged as to be well under the fixed quotations of the association. Somewhat singularly, neither of these tenderers secured the order, but, strangely enough, the successful offer was made by a concern which is a member of the association. The price bid was equal to about £4. 5/3 per ton at the works, whereas the official quotation of the association is £4. 15/3 per ton at the works. It would thus appear, on a first glance, that the association has been undersold to the extent of 10/3 per ton by one of its own members. At the same time Steel, Tozer & Hampton have been undersold also, and have lost the order. To the initiated this seems a bold attempt to force Steel, Tozer & Co. in the association, although I understand the executive of that body deny that they have adopted any such course. I have not seen any official denial of the facts, however, and if I was asked for my own opinion on the matter I should certainly say, in strict confidence, of course, that the affair had been so planned as to knock out Steel & Co., and so lead them to believe that they would be better in than out of the combination.

## THE IRON MARKET

remains quiet in all departments of the trade, and there is nothing in the present outlook indicative of an early change in either direction. The tentative improvement in the United States mentioned prior to the stoppage of Oliver & Phillips does not appear to have made any further progress, and current advice from other parts of the world are devoid of statements likely to encourage those who hold optimistic views. At the same time, it should be mentioned, there is nothing in the existing situation to favor an undue amount of pessimism especially as numerous causes are at work which are helping to restore the balance between production and consumption. These causes are moving silently and in some cases are wholly unseen, but their operations cannot be resisted, and the time will come sooner or later when a sudden spurt will excite surprise that it should not have been foreseen. It has also to be borne in mind that everything favors production at a cheaper rate than has ever before been known. Materials, fuel, labor and food are all at their lowest levels, so that we have every possible advantage in maintaining our competition with the rest of the world, and are enabled to offer inducements to buyers of a nature which suffices, there is little doubt, to sustain the volume of our export trade, even

if profits are on a limited scale. These are facts of an encouraging nature, and cannot be overlooked in any endeavors to forecast the course of business during the next few months. It is very probable, indeed, that all metals are now at their minima, and that by May or June a somewhat higher standard will have been attained, not in one "rush," but by a gradual and steady leveling up. At Glasgow warrants have been steady, and a fair turnover has been effected, closing at 42/4 per ton. In Scotch makers' brands there have been variations in both directions to the extent of about 6d. per ton in two or three quarters, but in a general way values have been undisturbed, and only a moderate business has been transacted during the week. Shipments from the Clyde of pig iron are on a poor scale and compare badly with last year.

At Middlesboro' the market has been quiet, although the ironmasters have resolved to prolong and probably enlarge the present arrangements for restricting the production. This was to have been expected under the circumstances, for as matters now stand the smelters have virtually lost control of their own business and are largely at the mercy of the middlemen, by whom they are constantly undersold. The shipments of Middlesboro' pig to Scotland are large, and will doubtless tend to keep Scotch pig down, as much of the iron thus sent is said to be placed in store. On the West Coast hematite pigs remain steady, not so much on account of the actual demand at the moment as owing to the strong impressions of the makers that their iron is relatively very cheap at 44/6 @ 44/6, as compared with Scotch and other sorts. Elsewhere crude irons are unaltered, but are not very strong. In heavy manufactured iron the tone is rather more hopeful, owing to the giving out of better shipbuilding orders, but quotations are very bare indeed. All kinds of merchant iron are as last week, both as regards business and prices. Old materials are dull and neglected. Freight rates are without variation, but are largely nominal, except to the antipodes, which rates are steady. Steel is quiet, and there are no features in respect of it worthy of special mention. Steel rails are as of late, with moderate employment at the mills and only a small amount of new business in the market. There have been inquiries this week, however, which may lead to the placing of further orders with the association.

## TIN PLATES.

In London there is no improvement to report. On the contrary, prices are a trifle weaker than they were at the time of my last report. I hear of some business being done in coke as low as 13/6, f.o.b. Liverpool, but this, if correct, cannot be taken as the actual market value, the majority of makers refusing to accept orders below 13/9. Some of the works are well employed on contracts at low rates, but others are reported to be working for stock. American buyers are open to place orders, but only on the most favorable terms. Therefore, taking matters as a whole, the Birmingham quarterly meeting has not improved matters in any way. I quote IC cokes 13/9 @ 14/3, and charcoals 16/ @ 16/6, f.o.b. Liverpool. At Liverpool there is no improvement in the prices of tin plates. In reality, things have gone from bad to worse since the quarterly meeting. There is a pretty fair and regular demand for coke tins, but that is of hardly any consequence nowadays, inasmuch as the supply overtops the demand, whatever the latter may be. The 250,000 boxes of tin plates in stock at the beginning of the year are ominous of mischief in the future. These plates will be played with like the stock of pig iron in Connell's stores, and thus the market will be kept in a depressed state all round, or at least until some extraordinary demand comes to sweep them off. The price of ordinary coke tins is now down to 13/6, IC, and, as many brands are now offering at this price, buyers have their choice, and, consequently, will not pay even this low figure for all the brands so offering. While this is fully admitted, it must, however, be borne in mind that there are numerous other brands which command, even now, higher prices, namely, 13/9, 14/ and up to 14/6, IC. The demand for wasters is well kept up, and prices vary from 13/ to 13/6. There has been a decided drop, also, in steel plates. Second qualities have been sold at from 13/9 to 14/3, IC. The demand for these, like that for coke tins, is a regular and fair average one, but the tendency of prices is still downward, the above figures not being firm by any means. Best steels in the same grades as regards finish are not in good request. There is but a poor demand for these, and, therefore, it is no wonder that it is difficult to obtain 15/ IC at present, excepting for certain well-known brands. Best steel plates in the various charcoal grades are only inquired for in limited quantities, the old sort of good orders being rather scarce. As to prices, these are also dropping daily. It seems hardly credible that any kind of charcoal plates can be bought under 16/ IC, but such is undoubtedly the fact. Of course the better-known brands are in better request and at higher prices, viz., 16/6 @ 17/6 IC, and best charcoals, 18/ @ 18/6. These latter, however, are now rather rare and exceptional prices, and such orders are not often got hold of. Terms are still slow and low in price, and there is but a very poor prospect of any improvement setting in soon, at least not until the spring months set in. The only remedy for all these low prices and a depressed market is a reduction of make.

**Casting Plate Glass.**—The operation of casting a plate is as follows: The glass in the pots having attained the proper degree of liquidity, and having received a thorough melting and refining, the fire is slackened to render the mass somewhat viscous by cooling. The doors in front of the pots are lifted or taken away; the workmen, with a long pair of iron pincers, take hold of the pot in the furnace, bring it upon an iron truck or carriage, and at a dog-trot carry it under the crane. The impurities or glass gall upon the surface of the glass are now scraped off and the pot carefully wiped on the outside with a wet cloth to prevent dirt from falling upon the casting table. The pot is now seized by a pair of strong iron tongs or

nippers and raised over the table by means of the crane. The casting table is a large cast-iron slab, well polished, mounted upon a carriage running over a railway. Upon this table two iron rules of the thickness of the required plate are now laid on each side. The pot suspended above is now tilted over and the glass poured upon the table. A heavy iron roller is now passed over the glass, the ends of which rest upon the thickness rules. During the rolling, if any impurities are detected in the glass when yet plastic, they are removed with suitable instruments. The plate is then annealed, after which it is ground, smoothed and polished, each being an operation requiring time and care.

## INDUSTRIAL ITEMS.

## MAINE.

A press dispatch from Bath says: "The report that two shipbuilding firms here (Goss, Sawyer & Packard and Goss & Sawyer) have failed conveys a wrong impression. They ask an extension of time, and for that purpose called a meeting of creditors. They expect to be able to pay in full. An examination shows liabilities of \$300,000. Captain Goss estimates the assets at \$600,000. A year ago they sold their shipbuilding business to the New England Shipbuilding Company, which continues the business with ample capital, being in no way affected by the embarrassments of the two firms."

## CONNECTICUT.

The Albertson & Douglass Machine Company, New London, are making extensive repairs to the United States steamer Monroe and the Hartford Line steamer City of Springfield. New surface condensers are to be placed in each, and a thorough overhauling given them. In addition to these, the company have a number of smaller steamers undergoing repairs, and report business fair.

## NEW JERSEY.

The American Sheet Mill, at Phillipsburg, resumed work on the 27th ult., having been idle since Christmas. The works employ 125 men.

## PENNSYLVANIA.

The rolling mill of the Hollidaysburg Iron and Nail Company, which has been idle in several of its departments for a long time, started up on full time on January 26. The nail factory connected with the works is still idle, with no prospects of resuming.

The Sharon Iron Company deny the reports recently published to the effect that they contemplate commencing the manufacture of steel nails.

A strong force of laborers and mechanics are preparing the foundation for the new furnace of Ferguson, White & Co., at Robeson. The old foundation has been taken out and the excavation made deeper. The columns for the furnace have also been taken out and columns of an entirely different pattern will be put in.

No. 2 blast furnace of the Reading Iron Works is being blown out for some necessary repairs.

Repairs on the spiegelisen furnace of the Lehigh Zinc and Iron Company, at Bethlehem, are being pushed forward, and it is expected the fires will be relighted at an early date.

John Cover, an experienced founder, has leased Fairchance Furnace, in Fayette County, for one year, with the privilege of leasing it the second year. He is to pay the company 50 cents a ton royalty on all the iron he makes.

The La Vergne Refrigerator Company, of New York, have awarded the Union Foundry and Machine Company, of Catsauqua, a large contract for castings, and last week a consignment was made to Washington, D. C., where they will be used in a large brewery in which the refrigerator company are placing their cooling apparatus.

The reports of the entire suspension of work at the mills and furnaces of the Stewart Iron Company, of Sharon, are incorrect. It is possible that the mill may shut down for a time, but there is no intention of blowing out the furnace at present.

Presley H. Moore, one of the owners of the Redstone Coke Works, near Uniontown, has purchased the coal and 50 acres of the surface of the 150-acre Clement farm, situated 1 mile north of Uniontown, for \$17,000. It is possible he will erect ovens on the premises this summer if the outlook improves. The coal lies within 1/2 mile of the Redstone Branch of the Pennsylvania Railroad.

A portion of the works of P. L. Kimberly & Co., at Sharon, were in operation last week, and some departments will probably be going this week. The firm do not know when they will put the whole works in motion.

One of the large blowing engines which are being built by the Weimer Machine Works, at Lebanon, for the Paxton Furnace, at Harrisburg, has been shipped. The other will be finished this month.

A dispatch from Newcastle says that the proposed co-operative scheme by which the employees of the Elma Iron Works, at that place, owned by P. L. Kimberly & Co., proposed to operate the works has fallen through, the men rejecting the proposition of the owners. The plan proposed required that the men allow the company to retain 25 per cent. of their earnings, which, should the operation prove a success, would be paid them in three months, otherwise it would be used to liquidate contracted debts. This met their approval, but Mr. Kimberly required \$4500 rent for the mill. The men deemed this exorbitant and rejected the proposition. Mr. Thompson, the secretary, states that the insurance and taxes on the mill amount to about \$2400, and he considers the rent as practically nominal.

## PITTSBURGH AND VICINITY.

The Philadelphia Company, through their attorneys, on January 28 served notice on the Penn Fuel Company of their intention to prosecute if the latter company persisted in laying the double safety-pipe in

connection with their gas mains. The Philadelphia Company claim that Mr. Westinghouse has the system covered by extensive patents. The Penn Company will fight the case, claiming that such pipes were used in the oil country long before the patent was taken out.

The Councils of Sharpsburg Borough, in which the Vesuvius Iron Works are situated, urged thereto by the recent natural gas explosion at the works, have passed a very stringent ordinance regulating the laying of natural-gas pipes.

B. F. Rafferty & Co., large coal miners and dealers, have confessed judgments aggregating \$70,000. At present rumors are conflicting as to what proportion the assets bear to the liabilities. The mines operated by B. F. Rafferty & Co. are the Eureka, Gough, Slope and Shaner mines, all on the line of the Baltimore and Ohio. The first two mines are owned by the firm and are unencumbered. These mines are valued at \$50,000. The mines have been running full and will continue till further notice.

Long & Co.'s Vulcan Forge, at McKees Rocks, went into operation January 24.

Singer, Nimick & Co., Limited, have started up their puddling department and their large open-hearth steel furnace. These portions of the mill have been idle about two months.

## OHIO.

The trouble with the employees at the steel plant of the Bellaire Nail Works, the end of which was referred to in these columns last week, was settled by the men going to work at the price recently established at the works of the Pittsburgh Bessemer Steel Company, at Homestead, Pa.

The Malleable Iron Works of Elbel, Gilliam & Co. will remain a Canton institution. On January 28 the business men and capitalists of that place offered the firm inducements to remain and rebuild, which were accepted. If the weather proves favorable the works will be again in operation inside of three months. Numerous other towns have been endeavoring to secure the works.

Judge Bradbury, the assignee of Watson & Co., of the Crescent Iron Works, Pomeroy, has consented to have the mill start and work up the stock on hand, which will take about three weeks. There is some probability that it may continue to run if certain arrangements now in progress can be made.

Canton is to have a stove foundry. At a meeting of the gentlemen interested in the project, held recently, it was decided to start with a capital stock of \$10,000, and of this amount \$7000 will be taken by the gentlemen who originated the project, leaving but a small balance to be taken up. The location of the works has been fixed, and a molding shop, 60 x 200 feet, will be put up as soon as the money is all subscribed. It is expected to have this completed by April 1.

Some experiments with a sample of hoop from steel rail made by the new process now in operation at the mill of the New York and Ohio Iron and Steel Company, at Iron-ton, have been made. The hoop was 20 gauge, which is .035 inch in thickness, and it stood a pull of 4800 pounds. This is at the rate of 130,000 pounds to the inch.

It is stated that the Union Rolling Mill Company, of Cleveland, will resume work this week at their rolling mill and blast furnace.

Propositions are pending for the renting of Iron-ton Furnace of the New York and Ohio Iron and Steel Company by the Messrs. Peters, who have a lot of ore which they want to work up.

The rolling-mill men and business men of Warren held a conference last week relative to the starting of the Westlake Mill on the co-operative plan. We are not advised as to the result.

The Williams Steel Company, of Alliance, make steel forgings all sizes up to 3 tons by the open-hearth process.

The largest hammer in the United States was placed in the works of the Cleveland City Forge and Iron Company the past week. Its weight is about 20 tons; with that of the anvil and appendages, 340 tons. Its height is 38 feet and the diameter of the cylinder is 38 inches. It was made by the T. B. Miles Machine Tool Works, Philadelphia, and cost between \$50,000 and \$60,000. The works are now running on a large Government contract for turn-buckles for light-houses and piers. Only 150 out of the 900 men usually employed are now at work.—*Iron Trade Review.*

The business of Brown, Bonnell & Co., of Youngstown, for the month of December, as shown by Receiver Brown's report, was as follows: Balance on hand December 1, \$12,831.97; receipts for the month, \$115,758.26; disbursements during December, \$4,243.80; balance on hand December 31, \$34,326.43.

The Leetonia Boiler Works of J. C. Thullen were entirely rebuilt the past year, and, with the best of machinery, are better equipped than ever for turning out work. These works have been established 14 years. Mr. Thullen is a practical boilermaker, and personally oversees all the work before it leaves the shop. His specialties are iron and steel boilers.

It is reported that the Cleveland Hardware Company are negotiating for the purchase of the Forest City Rolling Mills, operated by Atkins, Clark & Co.

## ILLINOIS.

The North Chicago Rolling Mills resumed operations on January 19, giving employment to about 1200 men. Work has since been temporarily stopped for lack of fuel. There was only enough on the premises to last four or five days, and, as the railroads are blocked with snow, the companies are unable to furnish the necessary supplies. The men stopped work Friday night, January 22. President Potter states that the stoppage will last a few days only.

The pattern-room and private office of the Lessig & Alden Bridge Works, in Lake View, Chicago, were burned on the morning of January 26. The chief loss was the de-

struction of all the drawings, plans and patterns belonging to the establishment, which were valued at from \$15,000 to \$18,000, on which there was about \$5000 insurance. The loss to the building will reach \$1000, and is fully covered by insurance. The machinery and belting on the main floor below, which were damaged by water, can be restored in 10 days. The work will go on in the other departments, and none of the employees will be thrown out of work.

The Superior Horse-Nail Company, of Chicago, have enlarged their equipment by putting in new forging machines. Still further additions are contemplated.

The Pekin Plow Company's works resumed January 26, giving employment to nearly 100 operatives. The works have been shut down several weeks.

The Moline Screw Company, a new enterprise organized for the manufacture of wood screws, commenced operations at Moline on January 1, in their three-story brick building, 64 x 64 feet. The active members of the firm are men of large experience in their line.

## MISSOURI.

The South West Lead and Zinc Company, who have zinc furnaces at Rich Hill and lead furnaces at Joplin, have recently changed their officers. W. F. Coleman is now president, in place of O. H. Picher.

The Gerst Bros. Mfg. Co., of St. Louis, will soon begin building an addition to their establishment, to be 50 feet wide and 136 feet deep. The new building will be used for office and foundry purposes. Their molding shop will be closed while the work is under way.

## IOWA.

The Standard Farm Machinery Company, of Burlington, has been incorporated by William Penrose, E. F. Tuttle and James R. Penrose.

## The Beginnings of Iron Shipbuilding.

The eighth volume of the Census Reports of 1880, in its chapter upon the shipbuilding industry of the United States, gives an interesting sketch by Henry Hall of the origin and development of the practice of employing iron in place of wood in the frames and outer planking of vessels—a topic in reference to which there is no little inquiry and dispute. Over 80 years, it seems, have elapsed since the first iron vessel was built, this being a little canal-boat with a wooden frame and bottom and sides of boiler iron. This little boat was used on a canal in England. Its lightness and buoyancy attracted much attention, and led to the construction of other boats of the same class. The first iron steamer was manufactured at Horsley, England, in 1821, put together in London, and sent to France for use. In the 10 years following a number of small iron steamboats were built for companies in England and on the Continent. Packets for use on the English coast were next built, and finally, in 1838, sailing vessels of from 200 to 300 tons register were built at Liverpool and elsewhere for the foreign trade. Two years later the iron shipbuilding industry was largely developed, the opinion having gained acceptance that, in England, at least, for all large tonnage it was cheaper to build of iron than of wood. The light weight and longer life of the iron vessel, as well as the fact that it costs from \$10 to \$20 per ton less than the wooden vessel, have gained for the former such a decided preference that in England the production of wooden tonnage has steadily declined year by year, until in 1884 it has virtually come to an end. It may be added that the first large iron steamship and the first large ship in which the screw propeller was used was the Great Britain, which made her first voyage from Liverpool to New York in August and September, 1845. Her designer was Brunel, who was so well known to fame as having constructed the Great Western in 1838 and the Great Eastern in 1859.

The first iron vessel put together and used in America was the *Codorus*, which was exported in pieces from England in 1825, and first employed on the Susquehanna River, in Pennsylvania. In 1835 there were five iron steamers in use on the Savannah River, built, it is supposed, in the North. In 1836 an iron steamer of 600 tons was launched at New York, and in 1838 another was built at Pittsburgh. In 1841 Boston and in 1842 Philadelphia added their names to the list of producers of this class of vessels. Baltimore's record begins, it is stated, with the new type of express steamer launched by Ross and Thomas Winans in 1858.

**The Decline in the Price of Food.**—The *American Grocer* publishes some interesting statistics obtained from its own files, showing the decline in wholesale prices of food products since the year 1870. Prior to 1879 the prices in domestic markets were largely governed by the premium on gold. Since that year all prices have been gold prices. The following exhibit shows, in a general way, the course of prices of leading articles:

	1870	1879	1881
Granulated sugar, 100 lbs.	12	9 1/2	7 1/2
Crushed sugar, 100 lbs.	11 1/2	9	6 1/2
Rice, 100 lbs.	11 1/2	11	9 1/2
Japan tea, 100 lbs.	5 1/2	20 1/2	19
Flour, 100 lbs.	6 1/2	5 1/2	4 1/2
Wheat, 100 lbs.	80 1/2	80 1/2	81 1/2
Butter, 100 lbs.	32	16 1/2	30
Cheese, 100 lbs.	17 1/2	13	12 1/2
Mackerel, 100 lbs.	24	18	25
Codfish, 100 lbs.	8 1/2	5 1/2	4 1/2
Wheat, 100 lbs.	81 1/2	81 1/2	82
Flour, 100 lbs.	5 1/2	4 1/2	4 1/2
Corn, 100 lbs.	1 1/2	1 1/2	1 1/2
Canned peaches, 100 lbs.	3 1/2	2 1/2	1 1/2
Canned oysters, 100 lbs.	1 1/2	1 1/2	1 1/2
Canned salmon, 100 lbs.	1 1/2	1 1/2	1 1/2

The most noticeable point in the *Grocer's* investigation is the steadiness of the prices of animal food (meat products) in the face of the general decline in agricultural products. This can only signify that as time goes on a larger proportion of mankind are able to buy the higher qualities of food, and this is a convincing proof that the wages of the laboring classes are steadily advancing, despite appearances to the contrary.

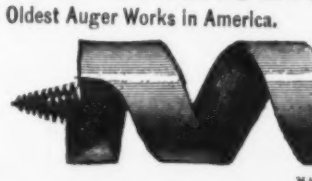





## Wholesale Hardware Prices, February 4, 1885.

Common Ball, American.....	dis 55 ¢	<b>Coffee Mills.</b>		C. Hammond & Son.....	dis 40¢10 @ 50 ¢	Mule Shoes.....	per keg \$4.75 @ 4.80
Amidon's.....	dis 50 ¢	Board and Box.....	dis 40¢10¢2 ¢	Humason & Becklev.....	dis 15 ¢ 20 ¢	Hose, Rubber.....	

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Amidon's.....	dis 50 ¢	Board and Box.....	dis 40¢10¢2 ¢	Humason & Becklev.....	dis 15 ¢ 20 ¢	Hose, Rubber.....	



Steel Carpet Tacks.....dls 50&10&2  
Double-pointed Tacks.....dls 75&105  
Wire Carpet Nails.....dls 50  
**Tap Borers.**  
Common and Ring.....dls 20&10  
Ives' Tap Borers.....Nos. 1, 2, 4.....dls 15&10  
Ives' Tap Borers.....Nos. 13, 14.....dls 25&10  
Enterprise Mfg. Co.....dls 20&10  
Clark.....dls 20&10  
**Tapes, Measuring.**  
American.....dls 25&10  
Spring.....dls 40  
Chesterman's.....Regular list dls 25  
**Thermometers.**  
Tin Case.....dls 35  
**Tinners' Shears, &c.**  
Shears and Saws (P. S. & W.).....dls 20&2  
Punches—See Punches.  
**Timbers.**  
Stamped S. S. & Co.....Net prices  
Pleced, S. S. & Co.....dls 90  
Sawed, S. S. & Co.....dls 35&25  
**Tramway Lifters.**  
Wollensack's Patent.....dls 35 05&55  
Reiher, Imp. Lifter, List, Oct., 1883.....dls 35&25  
Kachin.....dls 50&10&2  
**Toolbox Cutters.**  
Enterprise Mfg. Co. (Champion).....dls 20&10  
Wood Bottom.....P doz \$10.00, dls 30&10  
All Iron.....P doz \$18.00, dls 50&10  
Nashua Lock Co.....P doz \$4.50 net  
Wilson's.....P doz \$2.50, dls 10  
Clippier (Sargent & Co.).....P doz \$24, dls 50&10  
Acme.....P doz \$30.00, dls 40  
**Traps.**  
Game, Newhouse.....dls 35  
Game, Checkin Pattern.....dls 60&10&10  
Game, Blake's Patent.....P doz holes, 15  
Mouse, Wood, Choker.....P doz holes, 15  
Mouse Cage, Wire.....P doz \$1.50, dls 10  
Mouse Catch, Wire.....P doz \$2.50, dls 10  
Mouse, "Catch-em-alive.....P doz \$2.50, dls 15  
Mouse, "Bonanza".....P gross \$10 net  
Mouse, Delusion.....P gross \$15.00, dls 20  
Rat, "Decoy".....P doz \$10.00, dls 10  
**Trowels.**  
Lothrop's Brick and Plastering.....dls 20&10  
Red's Brick and Plastering.....dls 15  
Dixon's Brick and Plastering.....dls 15  
Clance's Plastering.....dls 30&10  
Clément & Maynard.....dls 25  
Eaton's Brick.....dls 20  
Brade's Brick.....dls 25  
Worral's Brick and Plastering.....dls 15  
Garden.....dls 20  
**Triers.**  
Butter and Cheese.....dls 25  
**Trucks, Warehouse, &c.**  
Penfield Brock Co.'s list, 1883.....dls 40  
**Twine.**  
No. 12, Flax Twine, 1/4 and 1/2 Balls.....18¢ 20¢  
No. 18, " " 1/4 and 1/2 ".....17¢ 18¢  
No. 24, " " 1/4 and 1/2 ".....17¢ 18¢  
No. 204, Mattrans, 1/4 and 1/2 Balls.....28¢  
Chalk Line, Cotton.....14¢  
Wason Line, Liner.....14¢  
2-Ply Hemp, 1/4 and 1/2 Balls (spring Twine).....15¢  
2-Ply " 1/4 and 1/2 Balls.....14¢  
Cotton Wrapping, 5 Balls to 5.....13¢  
2, 3, 4, and 5 Ply Jute, 1/2 Balls.....11¢  
Hops—6, 9, 12 and 15 lb to doz.....17¢  
**Vices.**  
Solid Box.....dls 50 or 50&10  
Paralle, Fisher & Morris Double Screw.....dls 15&10  
Paralle, Stephens.....dls 25  
Paralle, Parker's.....dls 20 or 25  
Paralle, Wilson's.....dls 55  
Paralle, Bonney's.....dls 40  
Paralle, Merritt's.....dls 40  
Paralle, Sargent's.....dls 15&20  
Paralle, Backus and Union.....dls 60&10  
Paralle, Double Screw Leg.....dls 15&10  
**THE JENNINGS & GRIFF**  
SOLE PROPRIETORS  
**L'Hommedieu**  
The Oldest Auger Works in America.  
  
"L'Hommedieu" { SHIP AUGER  
SINGLE TAP  
E. H. TRACY'S TREMAIL AND SCOTCH  
These Augers and Bits are designed especially for  
that they bear the stamp of "L'Hommedieu" or  
marks. Goods bearing these brands are fully war-  
ranted, good, ship Auger Pattern, furnished pro-  
**C. E. JENNINGS & CO.,**  
  
  
**SHEPARD HARDWARE**  
ESTABLISHED IN 1866  
MANUFACTURERS  
**HARDWARE**  
MAMMOTH  
MAIN BUILDING  
COVERS OVER  
**BUFFALO**  
**Nickle-Plating**  
SOLE MANUFACTURERS OF  
THE AMERICAN  
DYNAMO ELECTRO-PLATING  
MACHINE.  
Best Plating Machine  
In the Market.  
HEADQUARTERS FOR  
EVERYTHING  
IN THE PLATING AND  
POLISHING LINE.  
  
**Zucker & Levett Chemicals**

IN MANUFACTURING CO.,  
TORS OF THE  
**Auger Works,**  
Established by Joshua L'Hommiedieu in 1818



URERS OF  
GERS and SHIP AUGER BITS.  
GER PATTERN CAR BITS.  
TWIST BORING MACHINE AUGERS.  
H. PATTERNS FOR



MANUFACTURERS OF

"L'Hommedieu" } SHIP AUGERS AND SHIP AUGER BITS.  
 } SHIP AUGER PATTERN CAR BITS.  
 } SINGLE TWIST BORING MACHINE AUGERS.  
 E. H. TRACY'S TRENAIL AND SCOTCH PATTERN AUGERS.

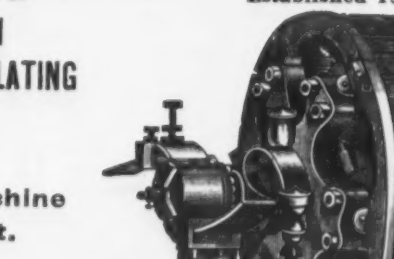
# Nickel-Plating and Polishing

SOLE MANUFACTURERS OF

THE AMERICAN  
DYNAMO ELECTRO-PLATING  
MACHINE.

Best Plating Machine  
In the Market.

HEADQUARTERS FOR  
EVERYTHING  
IN THE PLATING AND  
POLISHING LINE.



Established 1863.

WORKS:

## Zucker & Levett Chemical Co.,

538 to 564 W. 16th St. 36

**S. H. & E. Y. MOORE,**  
163 & 165 Lake St., Chicago.

AND  
**Railroad Supplies.**

"ZENITH" BARN DOOR HANGERS,  
For Wood Track,

RAILROAD HANGERS,  
PARLOR DOOR HANGERS.

EASTERN AGENTS :

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106 Chambers St. New York 47 Pearl St. Boston

## Engineering Materials

## ig Materials.

**THE**  
**Largest Manufacturers**

IN THE WORLD OF  
**Nickel Anodes,**

Nickel Salts,  
Patent Muslin Buffs,

Polishing Lathes,  
Polishing Felt,  
Polishing S

Polishing Rouges,  
Pol'ng Compositions,  
Waxing Leather

Walrus Leather,  
Wood Emery Wheels,  
Platers' Brushes

Platers, Brushes,  
&c., &c., &c.

to 40 11th Ave. NEW YORK, U. S. A.



# WHOLESALE METAL PRICES, February 4, 1885.

## METALS.

**IRON.**—Duty: Bars, 8-10¢ to 11-10¢; provided that no Bar Iron shall pay a less rate of duty than 35¢. Sheet, 11-10¢ to 13-10¢. Band, Hoop and Scroll, 16 to 14-10¢. Railroad Bars weighing more than 25 lb per yard, 7-10¢ to 1¢.

**Standard American Pig Iron.**  
Foundry No. 1 X..... 10¢ to 18.00 @ 19.00  
Foundry No. 2 X..... 10¢ to 17.00 @ 18.00  
Gray Forge..... 10¢ to 16.00 @ 17.00

**No. 1 Scotch Pig Iron.**  
Cambree..... 10¢ to 19.50 @ 20.50  
Colness..... 10¢ to 21.50 @ 22.00  
Shotts..... 10¢ to 21.50 @ 22.00  
Glenbrook..... 10¢ to 21.50 @ 22.00  
Gartshore..... 10¢ to 21.00 @ 22.00  
Langloan..... 10¢ to 21.50 @ 22.00  
Summerlee..... 10¢ to 20.50 @ 21.00  
Dalmellington..... 10¢ to 19.00 @ 20.00  
Clyde..... 10¢ to 19.50 @ 20.50

**Steel at Eastern Mills.** 10¢ to 26.50 @ 27.00  
**Old Rails.** 10¢ to 16.50 @ 17.00

**Scrap.**  
Wrought, 10¢ to 17.50 @ 18.00  
**Bar Iron from Store.**

Common Iron: 1/2 to 1 in. round and square..... 10¢ to 1.6 @ 1.9¢  
Refined Iron: 1/2 to 1 in. round and square..... 10¢ to 1.9 @ 2.2¢  
1 to 6 in. x 1/2 to 1 in..... 10¢ to 2.1 @ 2.4¢  
Rods—1 to 6 in. round and sq..... 10¢ to 2.3 @ 2.6¢  
Bands—1 to 6 in. round and sq..... 10¢ to 2.5 @ 2.8¢  
Burden's "H. B. & S." Iron, base price..... 10¢ to 2.6¢  
Norway Nail Rods..... 10¢ to 2.6¢

**Sheet Iron from Store.**  
Common..... 10¢ to 2.70 @ 3¢  
American..... 10¢ to 2.70 @ 3¢  
R. G. Cleaned..... 10¢ to 2.70 @ 3¢

Galvanized, 10 to 20..... 10¢ to 2.70 @ 3¢  
Galvanized, 21 to 24..... 10¢ to 2.70 @ 3¢  
Galvanized, 25 to 28..... 10¢ to 2.70 @ 3¢  
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Galvanized, 97..... 10¢ to 2.70 @ 3¢  
Galvanized, 98..... 10¢ to 2.70 @ 3¢  
Galvanized, 99..... 10¢ to 2.70 @ 3¢  
Galvanized, 100..... 10¢ to 2.70 @ 3¢

**Iron Wire.** See Wire.

**STEEL.**—Duty: Bars, Sheets, &c., valued at 4¢ per lb or less, 45¢ ad. val.; valued above 4¢ and not above 7¢ per lb, 25¢ ad. val.; valued above 7¢ and not above 10¢ per lb, 35¢ ad. val.; valued above 10¢ per lb, 45¢ ad. val. Extra—Steel Bars, Rods, &c., cold hammered or polished, in any way in addition to ordinary hot rolling, 15¢ per lb in addition to above; Steel Circular Saw Plates, 1¢ per lb in addition to the above.

**American Cast Steel.**  
For American Steel, see Pittsburgh quotations.

**English Steel.**

Best Cast..... 10¢ to 15.00 @ 16.00  
Extra Cast..... 10¢ to 14.00 @ 15.00  
Circular Saw Plates..... 10¢ to 14.00 @ 15.00  
Round Machinery Cast..... 10¢ to 14.00 @ 15.00  
Swaged Cast..... 10¢ to 14.00 @ 15.00  
Best Double Shear..... 10¢ to 14.00 @ 15.00  
Blister, 1st quality..... 10¢ to 14.00 @ 15.00  
German Steel, Best..... 10¢ to 14.00 @ 15.00  
2d quality..... 10¢ to 13.00 @ 14.00  
3d quality..... 10¢ to 12.00 @ 13.00  
Sheet Cast Steel, 1st quality..... 10¢ to 14.00 @ 15.00  
2d quality..... 10¢ to 13.00 @ 14.00  
3d quality..... 10¢ to 12.00 @ 13.00

**TIN.**—Duty: Plates, Sheets, Tagger and Terne, 1¢ per lb; Bars, Bloch and Pigs free.

Bales..... 10¢ to 18.00 @ 19.00  
Strains..... 10¢ to 17.00 @ 18.00  
English..... 10¢ to 18.00 @ 19.00  
Bar..... 10¢ to 18.00 @ 19.00

**Charcoal Tin Plates.**

1 C 10x14..... 10¢ to 11.00 @ 12.00  
1 C 12x12..... 10¢ to 11.00 @ 12.00  
1 C 12x14..... 10¢ to 11.00 @ 12.00  
1 C 12x16..... 10¢ to 11.00 @ 12.00  
1 C 12x18..... 10¢ to 11.00 @ 12.00  
1 C 12x20..... 10¢ to 11.00 @ 12.00  
1 C 12x22..... 10¢ to 11.00 @ 12.00  
1 C 12x24..... 10¢ to 11.00 @ 12.00  
1 C 12x26..... 10¢ to 11.00 @ 12.00  
1 C 12x28..... 10¢ to 11.00 @ 12.00  
1 C 12x30..... 10¢ to 11.00 @ 12.00  
1 C 12x32..... 10¢ to 11.00 @ 12.00  
1 C 12x34..... 10¢ to 11.00 @ 12.00  
1 C 12x36..... 10¢ to 11.00 @ 12.00  
1 C 12x38..... 10¢ to 11.00 @ 12.00  
1 C 12x40..... 10¢ to 11.00 @ 12.00  
1 C 12x42..... 10¢ to 11.00 @ 12.00  
1 C 12x44..... 10¢ to 11.00 @ 12.00  
1 C 12x46..... 10¢ to 11.00 @ 12.00  
1 C 12x48..... 10¢ to 11.00 @ 12.00  
1 C 12x50..... 10¢ to 11.00 @ 12.00  
1 C 12x52..... 10¢ to 11.00 @ 12.00  
1 C 12x54..... 10¢ to 11.00 @ 12.00  
1 C 12x56..... 10¢ to 11.00 @ 12.00  
1 C 12x58..... 10¢ to 11.00 @ 12.00  
1 C 12x60..... 10¢ to 11.00 @ 12.00  
1 C 12x62..... 10¢ to 11.00 @ 12.00  
1 C 12x64..... 10¢ to 11.00 @ 12.00  
1 C 12x66..... 10¢ to 11.00 @ 12.00  
1 C 12x68..... 10¢ to 11.00 @ 12.00  
1 C 12x70..... 10¢ to 11.00 @ 12.00  
1 C 12x72..... 10¢ to 11.00 @ 12.00  
1 C 12x74..... 10¢ to 11.00 @ 12.00  
1 C 12x76..... 10¢ to 11.00 @ 12.00  
1 C 12x78..... 10¢ to 11.00 @ 12.00  
1 C 12x80..... 10¢ to 11.00 @ 12.00  
1 C 12x82..... 10¢ to 11.00 @ 12.00  
1 C 12x84..... 10¢ to 11.00 @ 12.00  
1 C 12x86..... 10¢ to 11.00 @ 12.00  
1 C 12x88..... 10¢ to 11.00 @ 12.00  
1 C 12x90..... 10¢ to 11.00 @ 12.00  
1 C 12x92..... 10¢ to 11.00 @ 12.00  
1 C 12x94..... 10¢ to 11.00 @ 12.00  
1 C 12x96..... 10¢ to 11.00 @ 12.00  
1 C 12x98..... 10¢ to 11.00 @ 12.00  
1 C 12x100..... 10¢ to 11.00 @ 12.00

**Coke Tin Plates.**

Best..... 10¢ to 11.00 @ 12.00  
Ordinary..... 10¢ to 10.00 @ 11.00  
1 C 10x14..... 10¢ to 11.00 @ 12.00  
1 C 12x12..... 10¢ to 11.00 @ 12.00  
1 C 12x14..... 10¢ to 11.00 @ 12.00  
1 C 12x16..... 10¢ to 11.00 @ 12.00  
1 C 12x18..... 10¢ to 11.00 @ 12.00  
1 C 12x20..... 10¢ to 11.00 @ 12.00  
1 C 12x22..... 10¢ to 11.00 @ 12.00  
1 C 12x24..... 10¢ to 11.00 @ 12.00  
1 C 12x26..... 10¢ to 11.00 @ 12.00  
1 C 12x28..... 10¢ to 11.00 @ 12.00  
1 C 12x30..... 10¢ to 11.00 @ 12.00  
1 C 12x32..... 10¢ to 11.00 @ 12.00  
1 C 12x34..... 10¢ to 11.00 @ 12.00  
1 C 12x36..... 10¢ to 11.00 @ 12.00  
1 C 12x38..... 10¢ to 11.00 @ 12.00  
1 C 12x40..... 10¢ to 11.00 @ 12.00  
1 C 12x42..... 10¢ to 11.00 @ 12.00  
1 C 12x44..... 10¢ to 11.00 @ 12.00  
1 C 12x46..... 10¢ to 11.00 @ 12.00  
1 C 12x48..... 10¢ to 11.00 @ 12.00  
1 C 12x50..... 10¢ to 11.00 @ 12.00  
1 C 12x52..... 10¢ to 11.00 @ 12.00  
1 C 12x54..... 10¢ to 11.00 @ 12.00  
1 C 12x56..... 10¢ to 11.00 @ 12.00  
1 C 12x58..... 10¢ to 11.00 @ 12.00  
1 C 12x60..... 10¢ to 11.00 @ 12.00  
1 C 12x62..... 10¢ to 11.00 @ 12.00  
1 C 12x64..... 10¢ to 11.00 @ 12.00  
1 C 12x66..... 10¢ to 11.00 @ 12.00  
1 C 12x68..... 10¢ to 11.00 @ 12.00  
1 C 12x70..... 10¢ to 11.00 @ 12.00  
1 C 12x72..... 10¢ to 11.00 @ 12.00  
1 C 12x74..... 10¢ to 11.00 @ 12.00  
1 C 12x76..... 10¢ to 11.00 @ 12.00  
1 C 12x78..... 10¢ to 11.00 @ 12.00  
1 C 12x80..... 10¢ to 11.00 @ 12.00  
1 C 12x82..... 10¢ to 11.00 @ 12.00  
1 C 12x84..... 10¢ to 11.00 @ 12.00  
1 C 12x86..... 10¢ to 11.00 @ 12.00  
1 C 12x88..... 10¢ to 11.00 @ 12.00  
1 C 12x90..... 10¢ to 11.00 @ 12.00  
1 C 12x92..... 10¢ to 11.00 @ 12.00  
1 C 12x94..... 10¢ to 11.00 @ 12.00  
1 C 12x96..... 10¢ to 11.00 @ 12.00  
1 C 12x98..... 10¢ to 11.00 @ 12.00  
1 C 12x100..... 10¢ to 11.00 @ 12.00

**Tin Boiler Plates.**

1 C 12x20 M. F. 7¢ to 7.25 @ 7.50  
1 C 12x20 Tregional, Old Process..... 10¢ to 11.00 @ 12.00  
1 C 12x22..... 10¢ to 11.00 @ 12.00  
1 C 12x24..... 10¢ to 11.00 @ 12.00  
1 C 12x26..... 10¢ to 11.00 @ 12.00  
1 C 12x28..... 10¢ to 11.00 @ 12.00  
1 C 12x30..... 10¢ to 11.00 @ 12.00  
1 C 12x32..... 10¢ to 11.00 @ 12.00  
1 C 12x34..... 10¢ to 11.00 @ 12.00  
1 C 12x36..... 10¢ to 11.00 @ 12.00  
1 C 12x38..... 10¢ to 11.00 @ 12.00  
1 C 12x40..... 10¢ to 11.00 @ 12.00  
1 C 12x42..... 10¢ to 11.00 @ 12.00  
1 C 12x44..... 10¢ to 11.00 @ 12.00  
1 C 12x46..... 10¢ to 11.00 @ 12.00  
1 C 12x48..... 10¢ to 11.00 @ 12.00  
1 C 12x50..... 10¢ to 11.00 @ 12.00  
1 C 12x52..... 10¢ to 11.00 @ 12.00  
1 C 12x54..... 10¢ to 11.00 @ 12.00  
1 C 12x56..... 10¢ to 11.00 @ 12.00  
1 C 12x58..... 10¢ to 11.00 @ 12.00  
1 C 12x60..... 10¢ to 11.00 @ 12.00  
1 C 12x62..... 10¢ to 11.00 @ 12.00  
1 C 12x64..... 10¢ to 11.00 @ 12.00  
1 C 12x66..... 10¢ to 11.00 @ 12.00  
1 C 12x68..... 10¢ to 11.00 @ 12.00  
1 C 12x70..... 10¢ to 11.00 @ 12.00  
1 C 12x72..... 10¢ to 11.00 @ 12.00  
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1 C 12x80..... 10¢ to 11.00 @ 12.00  
1 C 12x82..... 10¢ to 11.00 @ 12.00  
1 C 12x84..... 10¢ to 11.00 @ 12.00  
1 C 12x86..... 10¢ to 11.00 @ 12.00  
1 C 12x88..... 10¢ to 11.00 @ 12.00  
1 C 12x90..... 10¢ to 11.00 @ 12.00  
1 C 12x92..... 10¢ to 11.00 @ 12.00  
1 C 12x94..... 10¢ to 11.00 @ 12.00  
1 C 12x96..... 10¢ to 11.00 @ 12.00  
1 C 12x98..... 10¢ to 11.00 @ 12.00  
1 C 12x100..... 10¢ to 11.00 @ 12.00

**COPPER.**—Duty: Pig, Bar and Ingot, 4¢; Old Copper, 3¢; Manufactured (including all articles of which Copper is a component of chief value), 35¢ ad. valorem.

Ingot, Lake..... 10¢ to 11.00 @ 12.00  
Ingot, Baltimore..... 10¢ to 11.00 @ 12.00  
Ingot, Anchor..... 10¢ to 11.00 @ 12.00  
Braziers' Copper, ordinary sizes, 16 oz. sq. ft. and over..... 10¢ to 11.00 @ 12.00  
Braziers' Copper, ordinary sizes, under 16 oz. and over 12 oz. sq. ft. and over..... 10¢ to 11.00 @ 12.00  
Braziers' Copper, 10 oz. and 12 oz. sq. ft. and over..... 10¢ to 11.00 @ 12.00  
Lighter than 10 oz. sq. ft. and over..... 10¢ to 11.00 @ 12.00  
Circles less than 84 in. in diam. and over..... 10¢ to 11.00 @ 12.00  
Segment and Pattern Sheets..... 10¢ to 11.00 @ 12.00  
Locomotive Fire-Box Sheets..... 10¢ to 11.00 @ 12.00  
Sheathing Copper, over 12 oz. sq. ft. and over..... 10¢ to 11.00 @ 12.00  
Bolt Copper..... 10¢ to 11.00 @ 12.00  
Copper Bottoms..... 10¢ to 11.00 @ 12.00  
Nickel-Plated Sheathing..... 10¢ to 11.00 @ 12.00  
Plating extra..... 10¢ to 11.00 @ 12.00  
Flat Copper Boiler Bottoms or Pits Bottoms, cut to special sizes..... 10¢ to 11.00 @ 12.00

**Tinning.**

14x18, by the case..... 10¢ to 11.00 @ 12.00  
14x18, less than case..... 10¢ to 11.00 @ 12.00  
For tinning both sides, double the above amount.

**O'Neill's Patent Plated Copper.**

14 and 16 oz. and heavier..... 10¢ to 11.00 @ 12.00  
12 oz. and lighter..... 10¢ to 11.00 @ 12.00  
7 in., 14x50, 8 in., 14x50, 9 in., 14x50, 14 and 16 oz. and heavier..... 10¢ to 11.00 @ 12.00  
(And all sizes not over 20 in. wide.)  
14x48 and 30x50..... 10¢ to 11.00 @ 12.00  
12 oz. and lighter..... 10¢ to 11.00 @ 12.00

**Copper Wire.** (See Wire.)

**Sheathing Metal.**

Yellow Sheathing Metal..... 10¢ to 11.00 @ 12.00  
**BRASS AND GERMAN SILVER.**  
Brown & Sharpe's Gauge the Standard for Metal; Old English Gauge the Standard for Wire.

Brass Manufacturers' Price List, January 17 1884..... 10¢ to 11.00 @ 12.00  
**LEAD.**—Duty: Pig, 2¢ per 100 lb; Old Lead, 2¢ per 100 lb; Pipe and Sheet, 3¢ per 100 lb.

American..... 10¢ to 11.00 @ 12.00  
Pipes..... 10¢ to 11.00 @ 12.00

Block Tin Pipe..... 10¢ to 11.00 @ 12.00  
Tin Lined Pipe..... 10¢ to 11.00 @ 12.00  
Sheet..... 10¢ to 11.00 @ 12.00  
Shot..... 10¢ to 11.00 @ 12.00  
Chilled Shot..... 10¢ to 11.00 @ 12.00  
**ANTIMONY.**..... 10¢ to 11.00 @ 12.00  
Hallett's..... 10¢ to 11.00 @ 12.00  
Cookson..... 10¢ to 11.00 @ 12.00  
**SPELTER.**—Duty: Figs, Bars and Plates, 1¢ per 100 lbs.

American, cash..... 10¢ to 11.00 @ 12.00  
Bergensport..... 10¢ to 11.00 @ 12.00  
**ZINC.**—Duty: Pig or Block, 1¢ per 100 lbs.  
Sheet, 2¢ per 100 lbs.  
600 lb casks..... 10¢ to 11.00 @ 12.00  
Zinc—Open..... 10¢ to 11.00 @ 12.00  
Zinc Tubing..... 10¢ to 11.00 @ 12.00

**Zinc Tubing.**—Dis. 25¢.

Plain..... 10¢ to 11.00 @ 12.00  
Fancy..... 10¢ to 11.00 @ 12.00  
Scotch and Extra Pattern..... 10¢ to 11.00 @ 12.00  
**BABBIT METAL.**

N. P. U..... 10¢ to 11.00 @ 12.00  
A. 15¢, B. 13¢ and 9¢.

**WIRE.**

**Market Wire.**—Put up in 63 lb bundles.  
Nos. 00 to 9, 10, 11, 12, 13, 14, 15, 16, 17, 18.

10..... 10¢ to 11.00 @ 12.00  
11..... 10¢ to 11.00 @ 12.00  
12..... 10¢ to 11.00 @ 12.00  
13..... 10¢ to 11.00 @ 12.00  
14..... 10¢ to 11.00 @ 12.00  
15..... 10¢ to 11.00 @ 12.00  
16..... 10¢ to 11.00 @ 12.00  
17..... 10¢ to 11.00 @ 12.00  
18..... 10¢ to 11.00 @ 12.00

Bright Market Wire..... 10¢ to 11.00 @ 12.00  
Charcoal..... 10¢ to 11.00 @ 12.00  
Bale Wire, Nos. 7 to 12..... 10¢ to 11.00 @ 12.00  
Fence Wire, Nos. 8 and 9..... 10¢ to 11.00 @ 12.00  
Grape Wire, Nos. 10 to 14..... 10¢ to 11.00 @ 12.00  
Coppered Market Wire..... 10¢ to 11.00 @ 12.00  
Bale Wire, Nos. 7 to 12..... 10¢ to 11.00 @ 12.00  
Galvanized Market Wire..... 10¢ to 11.00 @ 12.00  
Fence Wire..... 10¢ to 11.00 @ 12.00

**Stone or Weaving Wire.**

Nos. 16 to 18..... 10¢ to 11.00 @ 12.00  
Nos. 19 to 21..... 10¢ to 11.00 @ 12.00  
Nos. 22 to 24..... 10¢ to 11.00 @ 12.00  
Nos. 25 to 27..... 10¢ to 11.00 @ 12.00  
Nos. 28 to 30..... 10¢ to 11.00 @ 12.00  
Nos. 31 to 33..... 10¢ to 11.00 @ 12.00  
Nos. 34 to 36..... 10¢ to 11.00 @ 12.00  
Nos. 37 to 39..... 10¢ to 11.00 @ 12.00  
Nos. 40 to 42..... 10¢ to 11.00 @ 12.00  
Nos. 43 to 45..... 10¢ to 11.00 @ 12.00  
Nos. 46 to 48..... 10¢ to 11.00 @ 12.00  
Nos. 49 to 51..... 10¢ to 11.00 @ 12.00  
Nos. 52 to 54..... 10¢ to 11.00 @ 12.00  
Nos. 55 to 57..... 10¢ to 11.00 @ 12.00  
Nos. 58 to 60..... 10¢ to 11.00 @ 12.00  
Nos. 61 to 63..... 10¢ to 11.00 @ 12.00  
Nos. 64 to 66..... 10¢ to 11.00 @ 12.00  
Nos. 67 to 69..... 10¢ to 11.00 @ 12.00  
Nos. 70 to 72..... 10¢ to 11.00 @ 12.00  
Nos. 73 to 75..... 10¢ to 11.00 @ 12.00  
Nos. 76 to 78..... 10¢ to 11.00 @ 12.00  
Nos. 79 to 81..... 10¢ to 11.00 @ 12.00  
Nos. 82 to 84..... 10¢ to 11.00 @ 12.00  
Nos. 85 to 87..... 10¢ to 11.00 @ 12.00  
Nos. 88 to 90..... 10¢ to 11.00 @ 12.00  
Nos. 91 to 93..... 10¢ to 11.00 @ 12.00  
Nos. 94 to 96..... 10¢ to 11.00 @ 12.00  
Nos. 97 to 99..... 10¢ to 11.00 @ 12.00  
Nos. 100 to 102..... 10¢ to 11.00 @ 12.00  
Nos. 103 to 105..... 10¢ to 11.00 @ 12.00  
Nos. 106 to 108..... 10¢ to 11.00 @ 12.00  
Nos. 109 to 111..... 10¢ to 11.00 @ 12.00  
Nos. 112 to 114..... 10¢ to 11.00 @ 12.00  
Nos. 115 to 117..... 10¢ to 11.00 @ 12.00  
Nos. 118 to 120..... 10¢ to 11.00 @ 12.00  
Nos. 121 to 123..... 10¢ to 11.00 @ 12.00  
Nos. 124 to 126..... 10¢ to 11.00 @ 12.00  
Nos. 127 to 129..... 10¢ to 11.00 @ 12.00  
Nos. 130 to 132..... 10¢ to 11.00 @ 12.00  
Nos. 133 to 135..... 10¢ to 11.00 @ 12.00  
Nos. 136 to 138..... 10¢ to 11.00 @ 12.00  
Nos. 139 to 141..... 10¢ to 11.00 @ 12.00  
Nos. 142 to 144..... 10¢ to 11.00 @ 12.0



## HARDWARE NOVELTIES.

## Corundum Knife Sharpener.

The Union Stone Company, 38 and 40 Hawley street, Boston, are putting on the market the article named above and represented in the accompanying illustration. Like similar articles, it is made of wood, and is covered with corundum. It is about 11½ inches in length, and has a black-walnut handle with a ring attached, as represented in the cut. The manufacturers direct attention especially to its graceful shape and to the quality of the covering. They also



The Corundum Knife Sharpener.

refer to the low price at which it may be sold, but for information on this point we will refer our readers to the Trade Report.

## Colt's Malleable-Iron Lifting Jack.

The accompanying illustration represents the article thus designated, which is made by the Batavia Clamp Company, Batavia, N. Y. Its general construction will be readily understood from the cut. It is made, as its name indicates, of malleable iron, and stands 16½ inches high, weighing about 5 pounds. In operation, it is placed under the axle and the rack-bar is moved to the axle by hand. The lever is then raised, and by a forward movement a notch in the rack-bar is engaged and the bar raised as the lever

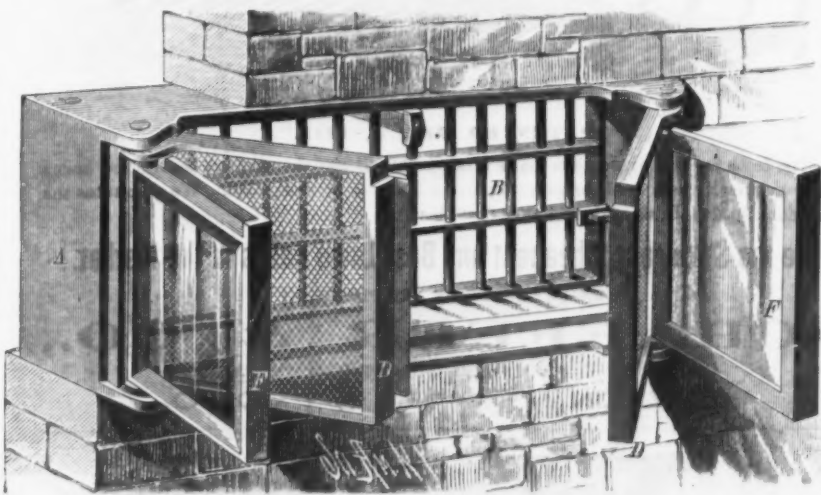


Colt's Malleable-Iron Lifting Jack.

is brought down and securely locked after passing a given point. The manufacturers call special attention to the fact that by means of the sliding fulcrum the lever, when operated, gains materially in lifting power.

## Combination Cellar-Window Grate.

Below we show a new article in the form of a cellar-window grate which is now being put on the market by J. S. Thorn, 1201 Callowhill street, Philadelphia. L. E. Snow, of No. 28 Central street, Boston, is the Eastern agent. The article is known as the Byar Patent Combination Cellar-Window Grate, Screen and Sash. Its general features are so clearly shown in the engraving as to require very little description. The frame of the grate is cast iron, and the grating is of a character similar to that used in ordinary construction. The inside line of the frame is formed in such a manner as to become a portion of the hinge of the screen and sash frame with which the grate is provided. The screen frame comes next the



The Byar Combination Cellar Window Grate, Screen and Sash.

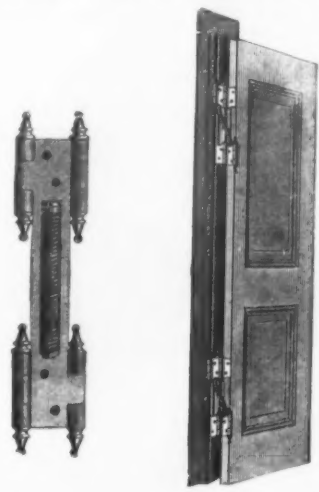
grating, while the glass is of smaller size and swings within it. By reference to the engraving it will be seen that the two swinging parts can be opened at once, or that the glass alone can be opened, according to circumstances. These goods are being made in various styles adapting them to different requirements. The frames are furnished with either segment or square tops, and they are of a character to be put in old buildings as well as new when circumstances demand. In addition to cast iron these goods are being made of wrought iron. The special advantages to which attention is directed in the manufacturer's circular are as follows: No wooden frames are required inside or outside. When the grates are shut they are perfectly tight, keeping out the cold, and yet are so arranged that they can be changed from closed grates to open grates.

These grates always admit light. There are no old carpets, shavings, straw or other materials stuffed into the openings, which darken the cellar while keeping it warm. Ventilation is readily secured during warm days in winter, which is practically impossible by the old method. Their construction is such as to keep out flies, mice and vermin generally, making them very acceptable to tidy housekeepers.

## Improvement in Spring Butts.

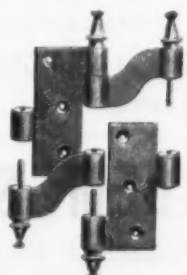
A new Double-Acting Spring Butt is being put upon the market by the Chicago Spring

Butt Company, 167 South Clark street, Chicago, the general features of which will be understood by inspection of the engravings, the first showing the butt itself, and the second showing its appearance when in place on a door, the door being swung open. The spring is not contained in the butt, but is placed in a connecting case between two three-leaved butts. Under these conditions



Chicago Double-Acting Spring Butt. The Butt in Place on a Door.

it is possible to use a larger and longer spring, with the additional cost only of the connecting strips or spring case. By these features the company avoid the clumsy appearance usual with spring butts where the spring is contained within them. The fact that one spring only is used in each butt, and is attached to the center of the bottom and the top of the center leaf, gives the spring a purchase in closing the door equal to the distance from the axis to the center of the leaf. The spring uncoils, exerting some force in this direction, and, in addition, acts against the door by reason of the shape into which it is forced by the act of opening the door. The general appearance of the spring with the door



The Chicago Blank Butt.

open illustrates this. The manufacturers state that by drawing a top and bottom pin on opposite sides one outside leaf is released to apply to the door.

## Improvements in Pumps.

Messrs. Clark Bros., of Belmont, N. Y., are introducing several improvements in Pumps, among which are the two shown in the accompanying illustrations. The first represents a pump specially designed to meet the requirements of drilled wells of small bore, and is so constructed that the cylinder and pipes will enter and pass into the casing or drilled hole, up to the base or platform flange, thus avoiding the cutting off of the casing and enabling persons using this pump to close the well up at the platform, thus keeping it clear of surface water

and other contaminations. The pump shown is of the character peculiar to this firm, and has all the advantages of their regular divided cylinder pump, including double pistons working in brass cylinders, piston-rod, air chamber and wrought-iron four-post standard. This pump is guaranteed by the manufacturers to be non-freezing, to work easily and to throw a continuous stream. Two sizes are made—one with 2½ and the other with 3 inch cylinder. For wells of moderate depths, seamless drawn brass tubing is used for the lower cylinders, with inside screwed caps and valve seats and common plungers. For wells of considerable depth there are furnished special depth well cylinders, with plungers having brass balls, &c. The second illustration shows a suction pump with vacuum chambers. This pump is also adapted to driven wells, since the vacuum chamber causes a steady flow of water through the suction-pipe and prevents any jerking action common to pumps used for this purpose, especially when the handle is being operated rapidly. The same pump is used advantageously on open wells of 25 feet depth and less. The standard is neat and substantial, and is of convenient size for in-

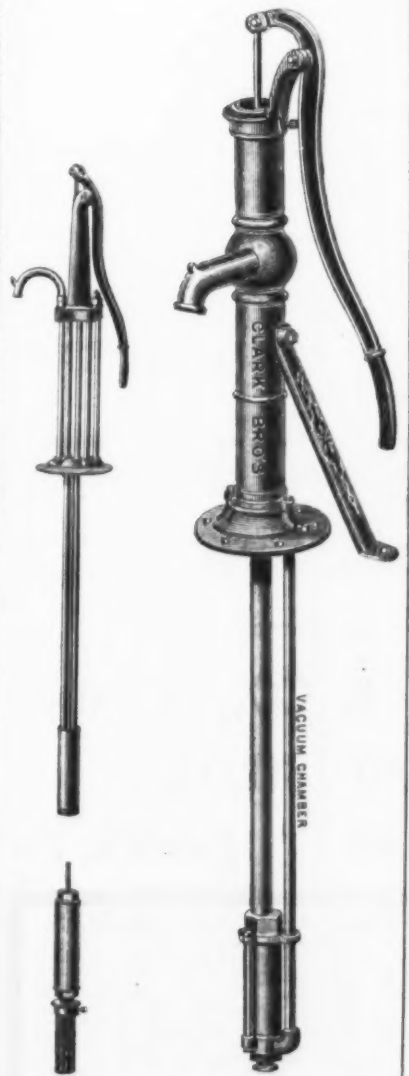


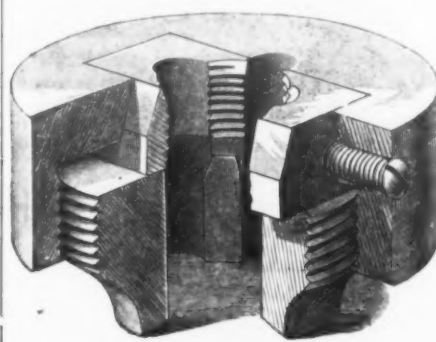
Fig. 1. Fig. 2. Improvements in Pumps.—Fig. 1.—New Champion Drilled Well Pump. Fig. 2.—New Champion Suction Pump.

door use. A special advantage to which the makers direct attention is that the cylinder is made of seamless drawn brass tubing. It is screwed in place by a special method which facilitates the economical use of brass, and which makes these pumps almost as low in price as the common suction pump with iron cylinder. The pump is rendered anti-freezing by a vent in the connecting-pipe. Still another advantage is that all the working parts are readily accessible without removing the pump from the well. To get at the piston and check-valve, it is necessary to loosen the cap screws that fasten the standard to the base-plate, and also to loosen the nuts on the cylinder bolts. The bolts will then slide out of their sockets, allowing the standard and pipe to be drawn up to any convenient height, where they may be held in place by a prop under the bottom of the standard resting on the base-plate. The cylinder may then be removed, exposing the check-valve and piston. The vacuum tube holds the suction-pipe in position so that no part of the pump need be removed from the well. With driven wells this is an important consideration, as the pump need never be unscrewed from the pipe, and all the work to be done can be accomplished with a common monkey-wrench. Two sizes of this pump are made, namely, 3-inch brass cylinder, fitted for 1¼-inch pipe; and a 3½-inch brass cylinder, also fitted for 1¼-inch suction-pipe.

These pumps are also manufactured by the Sandwich Enterprise Co., Sandwich, Ill., who control the manufacture and sale of the New Champion Force Pumps for the Western States.

## The New "Little Giant" Adjustable Die Screw-Plate.

This article is manufactured by Wells Bros. & Co., Greenfield, Mass., and intended for the use of blacksmiths, carriage-makers and machinists. Its special features are illustrated in the accompanying cut, which gives a sectional view of the die and collet. The object of the manufacturers has been to make a die as nearly solid as may be while still adjustable, and to their success in this effort they direct the attention of the trade. It will be seen that the cutting parts of this die are entirely surrounded by the collet, and that the cap has a beveled slot, into which the bevel of the die is fitted. The guide is screwed into the cap, and has a bearing surface at bottom of die, which forces the die into the bevel of the cap. This guide is not removed unless it is desirable to put in new dies. In this manner it will be seen that taper-headed and cup-headed screws are done away with, and that the die is held firmly—as firmly, the manufacturers say, as if it were welded to the remaining parts of the collet. To adjust simply turn the screws at the ends of dies in or out, as the adjustment desired requires. The manufacturers direct special attention to the simplicity and strength of this tool, and write us that they are placing large quantities with the trade, authorizing them to put them out in competition with other makes of plates, and return them if not satisfactory. The new illustrated catalogue for 1885 gives a full description of their



New 'Little Giant' Screw-Plate.—Sectional View of Die and Collet.

large line of screw-cutting tools and machinery, as well as a complete list of their blacksmiths' and carriage-makers' tools and machinery.

## New Pipe-Wrench.

The accompanying illustration represents a new Pipe-Wrench made by the Bemis & Call Hardware and Tool Company, Springfield, Mass., which is put on the market as the result of their experience as to the requirements of wrenches for pipes and other cylindrical substances. It will be perceived that in producing this wrench they have incorporated features which are found in some of their other wrenches and covered by patents that they own. It will be seen by reference to the cut that the mechanism of the wrench is such that the jaws, when not in use, stand obliquely or wedge-shaped, thus giving to their inclination the widest opening at that point which receives the pipe or body to be turned. This allows an instantaneous application without action or retroaction of the nut or sleeve in receiving or disengaging the work. When the wrench is in use the operation on the spring in the movable slide gives the pipe an inward tendency or rolling motion toward the bar, thereby tightening its grip on the same, but upon release of pressure the jaws, through the spring, resume their natural position and continue to grasp and release successively as long as required, no use of the nut being needed, as before stated, except to change the relative position of the jaws for different sizes of work. The serrated jaws of the wrench are interchangeable—that is, the same serrated plate may be used for either the stationary or sliding jaw, so that if one plate is broken another can be furnished



Bemis &amp; Call's No. 3 Pipe-Wrench.

adapted to either jaw without express designation. The slides, nuts and various parts are also interchangeable, and as they are suited to like wrenches they can readily be replaced when broken, thus easily repairing the wrench at very small expense, and with as perfect practicability for further use as when the wrench was new.

**Comparative Statistics of English and Foreign Railways.**—Mr. J. S. Jeans, the secretary of the British Iron Trade Association, has prepared a long report on the comparative statistics of English and foreign railways, in which he shows that in the United Kingdom the average receipts on railways per ton of minerals carried rose from 18.1d. in 1881 to 20.6d. in 1882, or 2.5 per cent. increase; while in 1883 the average was 21.1d., or 2.4 per cent., per ton per mile over that of 1882. This represents an increase of 3d. per ton moved within two years. Within the past 20 years there has been a remarkable increase in the average receipts from minerals, the proportion of goods and minerals to passengers in 1883 being 57 as against 43 per cent. In 1880 the average receipts from goods and mineral traffic in the United Kingdom was 3/ per ton, against 3/3 in Prussia, 2/2 in Belgium and 2/8 in Holland, the receipts per mile being £2250 in England, £934 in the United States, £1600 in Prussia, £1812 in France and £1570 in Belgium. In the United States, France, Belgium and Germany there has in recent years been a continuous tendency in the direction of reducing railway rates; in England no such reduction has been noted, but rather the contrary.

## Continued Decline in British Trade

According to the Board of Trade returns for 1884, which were referred to in our English letter last week, there was a decrease in the British export trade of £7,000,000, which included all classes of goods except chemicals. The falling off in imports was remarkable, there being a difference of £36,000,000 between 1883 and 1884. The decrease in exports of iron and steel alone accounted for more than half the total decrease, the value being £4,000,000 less and the tonnage 550,000 tons less than in 1883. The following table gives a summary and comparison of the exports of iron, steel, metals and their manufactures for 1884 with the two preceding years:

Articles.	1884.	1883.	1882.
Value, £.	Value, £.	Value, £.	
Iron and steel, .....	24,487,669	28,590,216	31,598,906
Machinery and mill work, .....	13,051,028	13,433,081	11,932,247
Hardware & cutlery, .....	3,140,509	3,156,149	4,107,125
Brass manufactures, .....	452,469	432,031	414,383
Copper, unwrought, .....	1,054,703	1,143,031	909,341
Copper, wrought, .....	1,437,301	1,244,773	1,274,215
Mixed or yel. metal, .....	1,056,058	1,181,666	1,150,622
Tin plates, .....	4,745,702	4,705,408	4,642,125
Lead, .....	421,500	539,144	577,325
Plate and pld. wares, .....	321,554	340,168	350,875
Telegraphic wires & apparatus, .....	2,500,077	1,337,893	1,042,561
Tin, .....	463,165	324,049	579,537
Zinc or spelter, .....	100,167	98,741	125,969
Iron rails, .....	101,990	171,647	307,233
Steel rails, .....	2,884,080	4,421,605	4,394,237

These figures, it will be noticed, show a very general decline in British exports, the only exceptions of note being wrought copper, mixed or yellow metal, tin plates and telegraphic wires and apparatus. With reference to iron and steel especially, it would seem that, though the export trade of Great Britain has fallen to a very low ebb, it is destined to go still lower, the December figures being quite startling. The total exports of iron and steel to all countries in that month amounted to 228,862 tons, against 279,081 tons in December, 1883, and 288,082 tons in December, 1882. The exports of rails to the United States have dwindled to 17,829 tons for 1884, against 74,801 tons in 1883 and 108,275 tons in 1882, while in December last not a rail was exported from Great Britain to this country. The total exports of pig iron, iron and steel rails and of all iron and steel products to the United States from Great Britain in the last three years were as follows:

Years.	Pig Iron, Tons.	Rails, Tons.	Total exports of iron and steel, Tons.
1882.....	498,970	198,375	1,198,342
1883.....	289,408	74,801	691,797
1884.....	157,012	17,829	452,281

Great as the decline in the trade has been, there is reason to believe its downward progress has not yet been arrested, and that the present year will see still further shrinkage.

## California Quicksilver Product.

The product of California quicksilver for the year 1884 was 31,913 flasks, according to the San Francisco Bulletin. This is the smallest yield in many years. Only nine mines are now producing the article, and two-thirds of the total is from the New Almaden, in Santa Clara County. The monthly yield of all the mines last year never once reached 3000 flasks, and fell as low as 2300 flasks. The total product of all the mines for the year was as follows:

	Flasks.
New Almaden.....	30,000
Great Western.....	3,292
Etna.....	2,931
Napa Consolidated.....	1,376
Guadalupe.....	1,179
New Idria.....	1,025
Sulphur Bank.....	870
Redington.....	881
Great Eastern.....	332
Various.....	7
Total.....	31,913

Prices opened in January, 1884, at \$26 to \$26.25 per flask. These were the lowest rates for the year. For the following six

months the highest rate was \$29. In August the rate was advanced to \$30, and the market ran along at that figure to \$31 for three months. In November the price was raised to \$34, and in December to \$35, though there were sales in November as low as \$29 and in December as low as \$32 per flask. This advance at the close of the year was due to a sharp speculative movement in London, which concentrated stocks. Though the rate was nominally raised to \$35, no sales were made, so far as we are advised, at that figure, though sales were reported in December at \$32. The product and prices for the past five years compare as follows:

	Flasks.	Highest.	Lowest.
1880.....	59,926	\$31.45	\$27.55
1881.....	60,854	30.75	27.90
1882.....	52,732	29.05	27.35
1883.....	46,735	28.50	26.00
1884.....	31,913	35.00	26.00

The reduced fares for passenger transportation on the Atlantic steamships are ruinous to the prospects of stockholders, unless there is a new start in emigration, of which thus far there is no appearance. The emigrant rate from Europe a year ago was \$28, now it is down to \$15. Until our industries are more promising America will be less attractive to the European observer.

The Canadian Pacific Railway Company have obtained a judgment at Montreal for \$1,500,000 against the line to Boston and Portland, which is understood to be the first step of the plaintiff toward possessing a winter outlet on the Atlantic seaboard. At the Pacific terminus they expect to have steam lines direct to Yokohama and Hong Kong.



## The Water Jet in Pile Sinking.

Speaking of the discovery of the value of a water jet in sinking piles in sand, a correspondent of the *Engineering News* supplies some interesting particulars. It appears that in 1859 or 1860 Capt. W. H. Stevens, afterward a brigadier-general in the Confederate army, was engaged in constructing an iron lighthouse near Galveston, Texas. The platform carrying the plant for sinking the screw piles intended for the foundation was wrecked by a storm, and the mass of ironwork was soon firmly imbedded in the quicksand beneath. In the attempt to recover the lost material Captain Stevens donned a suit of submarine armor and went down to study the effect of a jet of water in loosening the buried members of the lighthouse. He soon discovered that he himself was firmly anchored in the quicksand, and on applying the jet to his feet with the intention of freeing himself, was soon buried to his waist. However, signaling to his men to hoist, and at the same time stirring up the sand with the jet, he was rescued without difficulty. The experience was not lost upon him, and shortly afterward he successfully applied the jet action in sinking piles in sand. As a matter of interest it may be well to state that during the late war Col. S. H. Lockett, chief engineer of the Department of the Gulf, in this manner filled the Bay of Mobile with obstructions, sinking trunks of trees 3 feet in diameter, and sharpened at both ends, into the sand and firmly anchoring them there by the use of a jet from a common fire engine on a steamboat. The piles were planted from 12 to 20 feet deep, and they settled in the sand at the rate of 12 inches per second under a jet from a 1½-inch nozzle on a 3½-inch hose. The nozzle was held by two staples down near the point of the pile, and was secured there by a small rope passed through the staples. Five thousand piles were thus put in.

**Natural-Gas Explosions.**—A very serious casualty caused by natural gas took place at the intersection of Thirty-fourth street and Penn avenue, Pittsburgh, last Saturday. The mains of the Fuel Gas Company run along the latter thoroughfare, and the gas which exploded probably escaped from them. There were three explosions in quick succession, each occurring in a different house in the locality named. The houses in which the gas exploded were very badly damaged, together with several other houses in the neighborhood, and 21 people, who were either within or passing upon the street, were more or less severely injured, one being fatally hurt. Much excitement and considerable ill-feeling against the gas company was caused by the explosion. The company, however, are doing all in their power to aid the injured, and are taking steps to prevent further accident.

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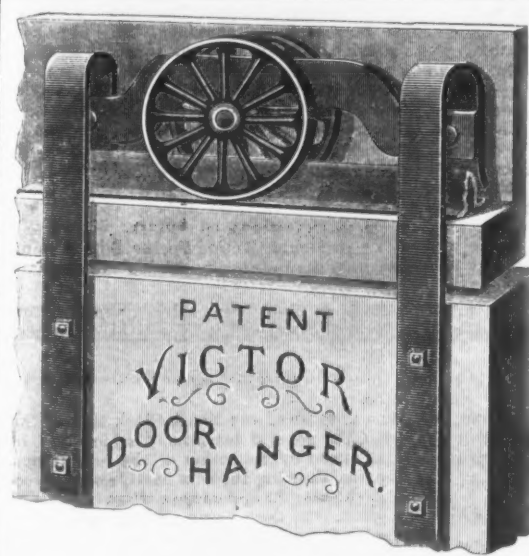
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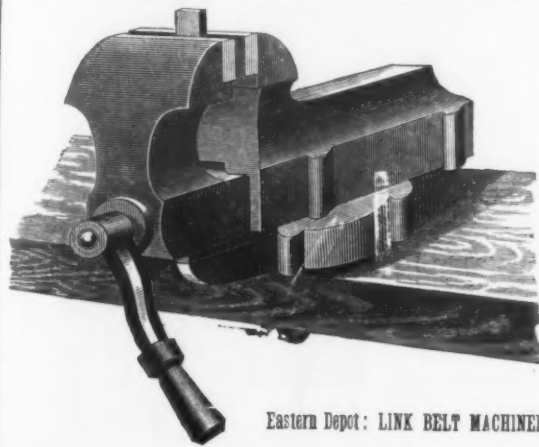
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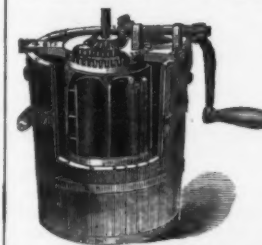
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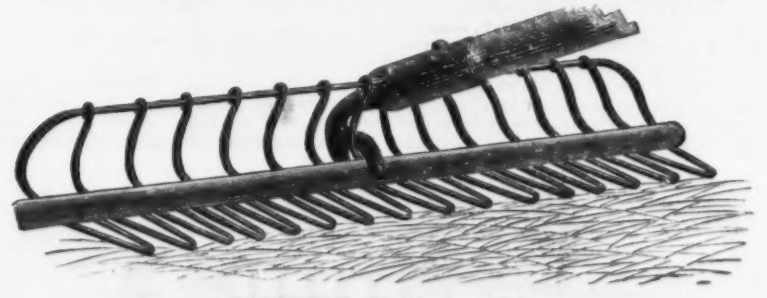
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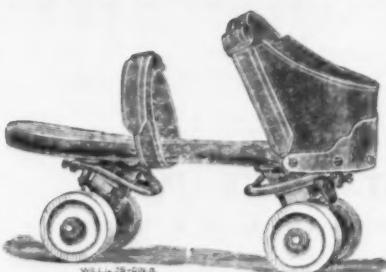
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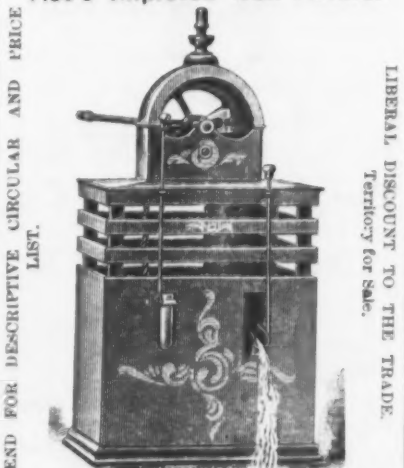
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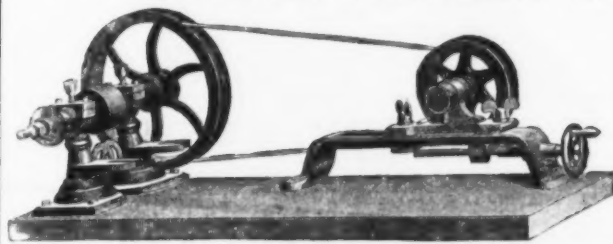
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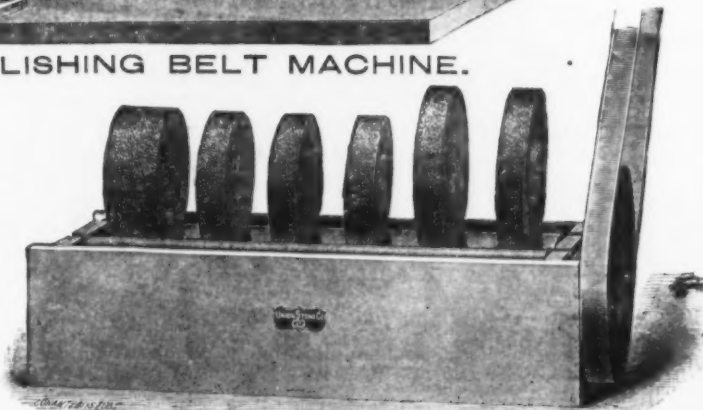
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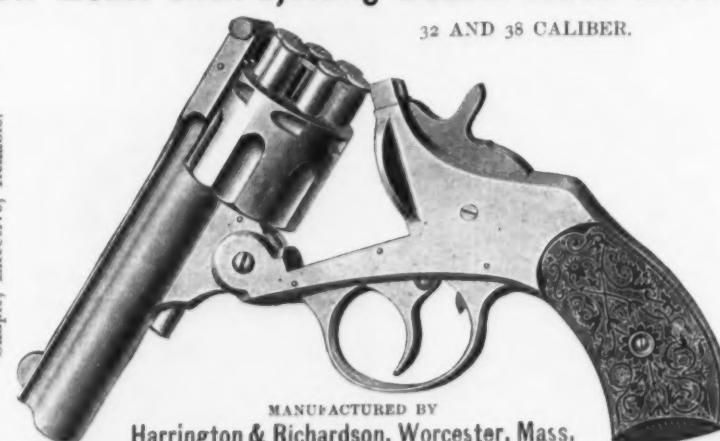


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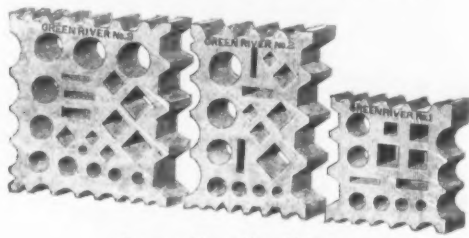


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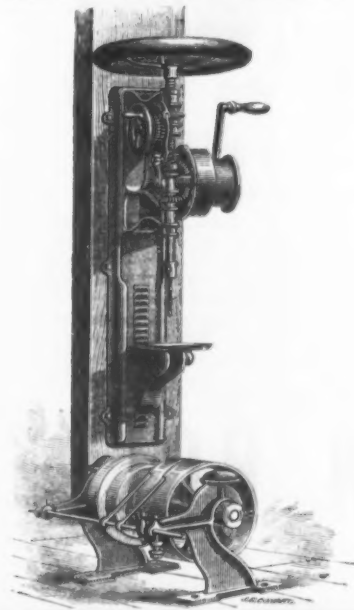
**GREEN RIVER SWAGE BLOCKS.**

No. 1,  $12\frac{1}{4} \times 12\frac{1}{4} \times 4\frac{1}{4}$  inches.  
No. 2,  $13 \times 13 \times 4\frac{1}{4}$  inches.  
No. 3,  $18\frac{1}{4} \times 18\frac{1}{4} \times 4\frac{1}{4}$  inches.  
Same as above, — planed both sides.

SEND FOR NEW PRICE LIST.

**THE GREEN RIVER HORSE-SHOERS' MACHINE.**

A Vice and Steel Dies expressly for welding and swaging toe and heel calks.



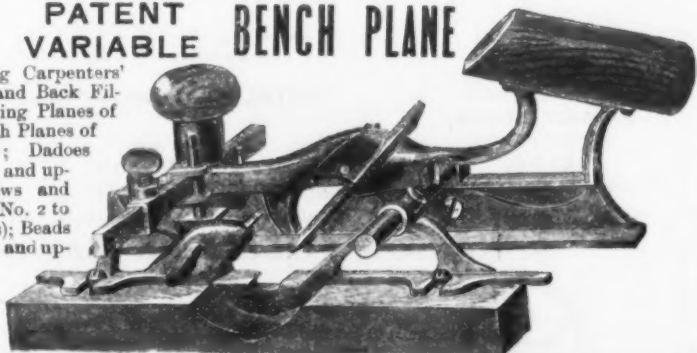
The groove running the whole length of the cone gives room for grasping work with the tongs. When a ring with an eye-bolt is being made, the eye and bolt lie in the groove while the ring is being rounded up.

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 $\frac{20}{100}$  Caliber.

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FLAT RAILS

OF IRON OR STEEL,

FISH BARS

OF IRON OR STEEL

**NORTHFIELD LOCKET KNIVES**

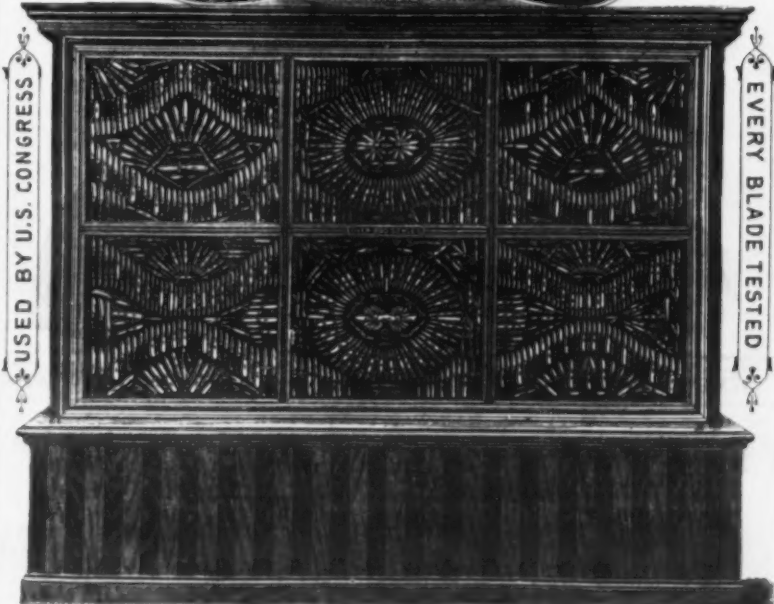
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From Photographs. Show Case 12 feet wide 9 feet high.

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5. It WILL NOT SPLIT the wood.
6. It will CUT OFF NAILS.
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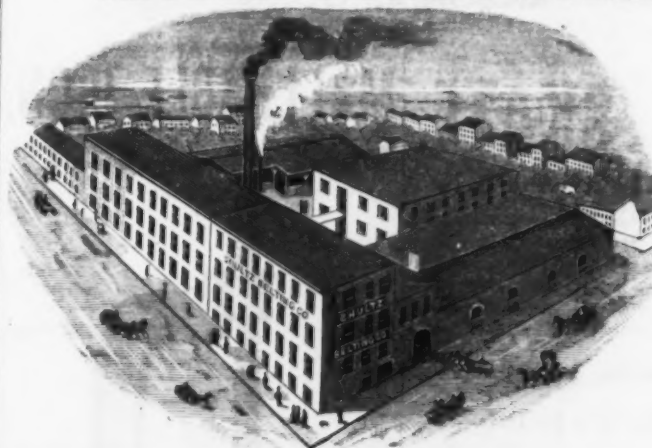
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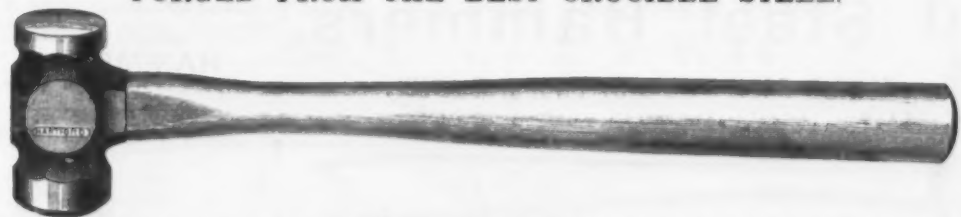
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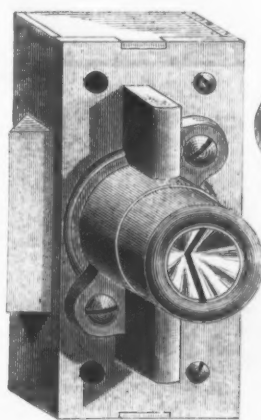
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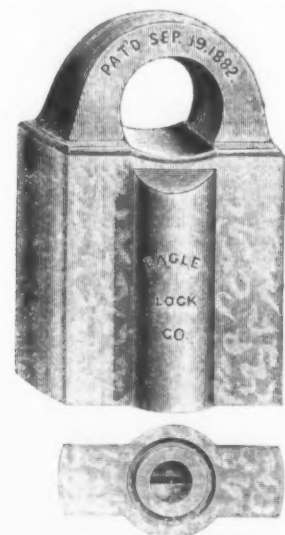
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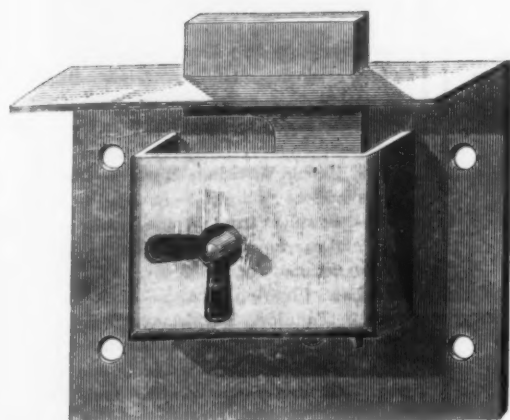
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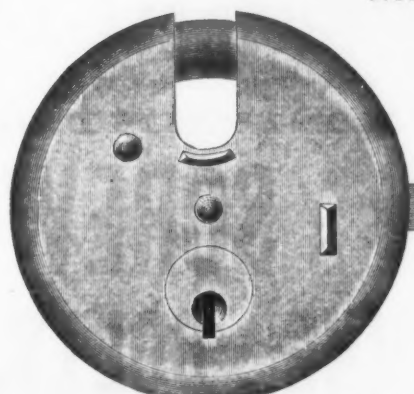
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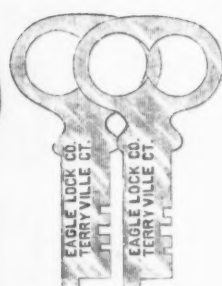
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No. 101.



No. 4002 (Iron).



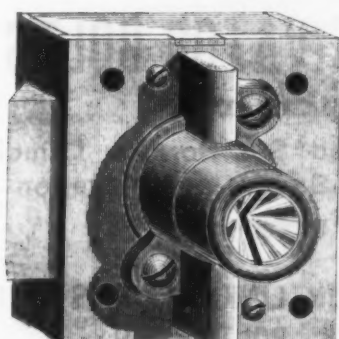
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No. 4023.



No. 800.



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No. 4027.



No. 4011



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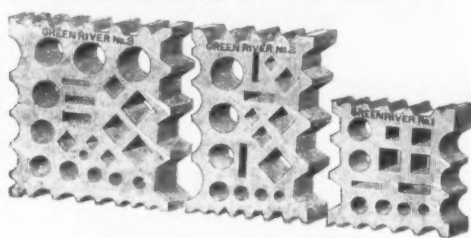
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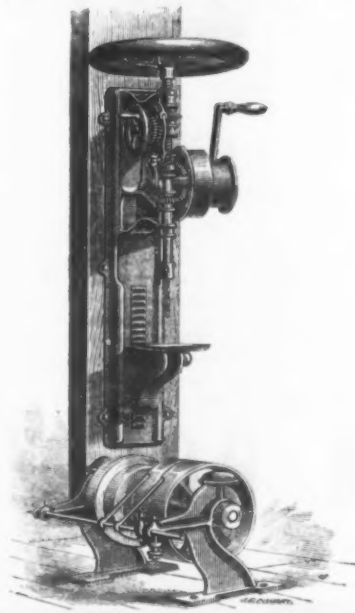
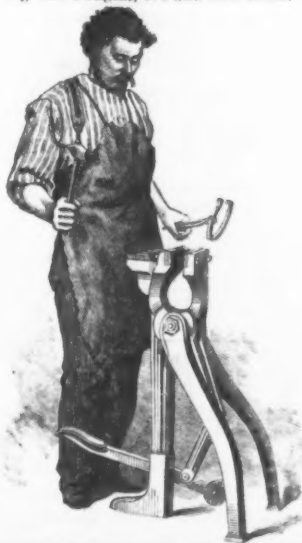


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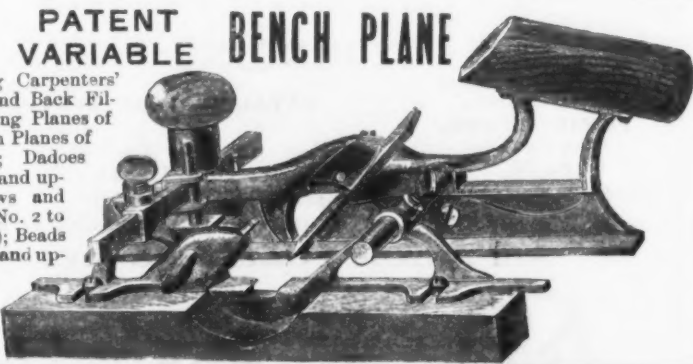


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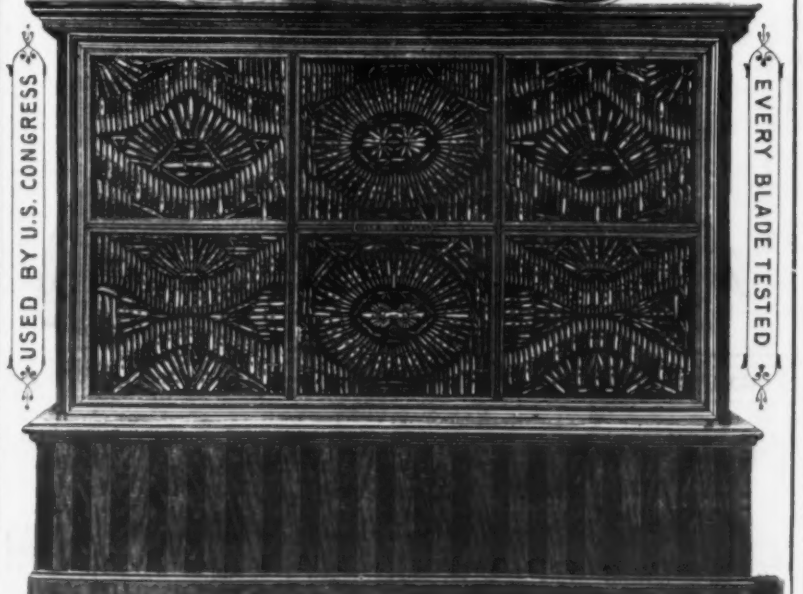
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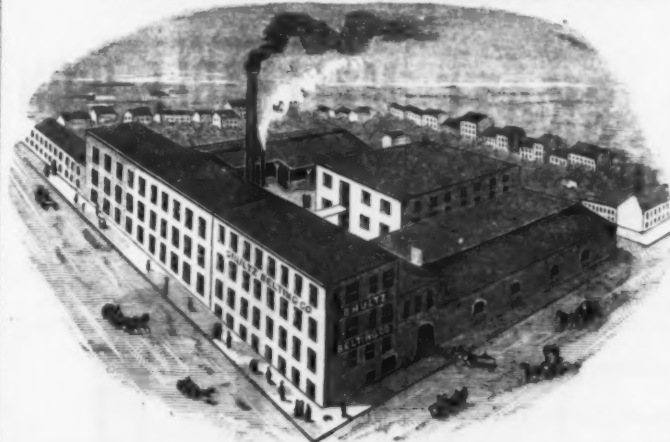
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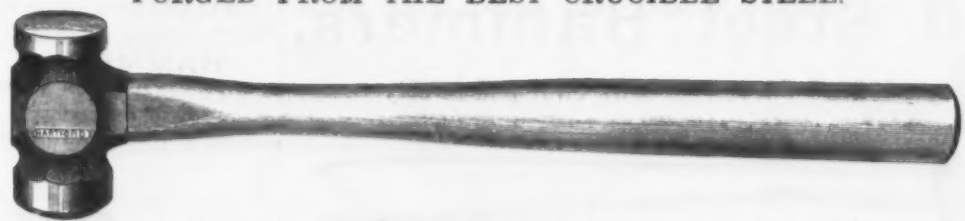
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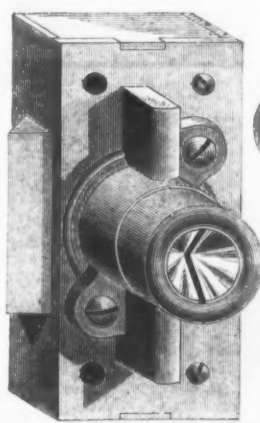
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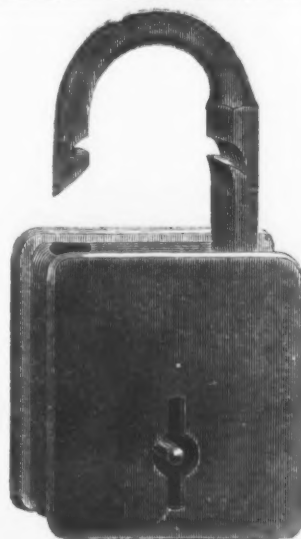
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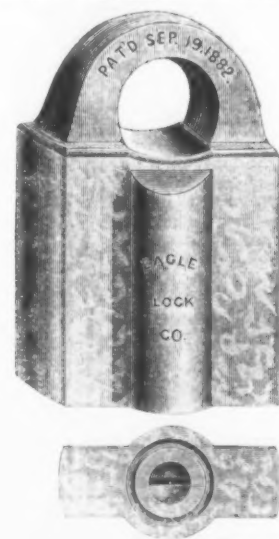
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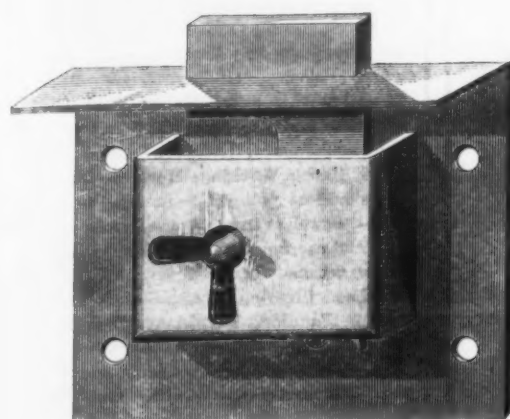
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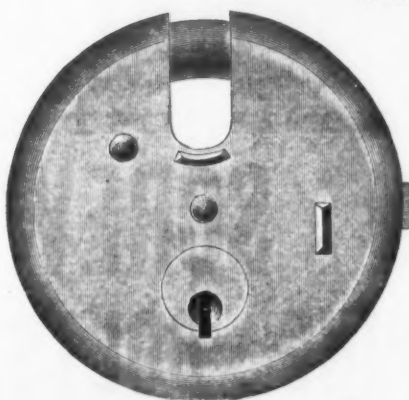
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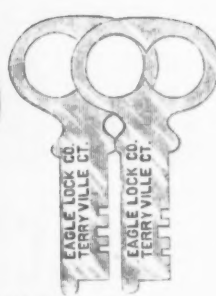
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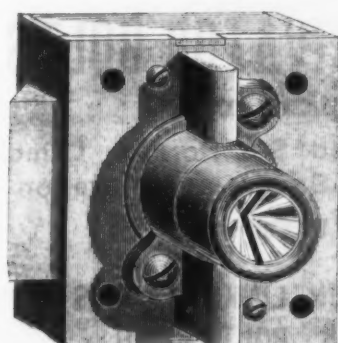
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This work is just what its title indicates. It embraces the blast furnaces, rolling mills, steel works, forges and bloomeries in every State and Territory. The names of establishments are given first, followed by the names of owners and their post-office addresses.

The book contains a complete summary of the number and capacity of the iron and steel works which are described in the present edition, compared with the summary which accompanied the previous edition, which was corrected to July 25th, 1882.

*Bayley.—The Assay and Analysis of Iron and Steel, Iron Ores and Fuel.* By Thomas Bayley; 17 illustrations, 91 pages, 12mo, cloth. . . \$1.40

This little book is a reprint, with some additions, of a series of articles which have appeared in the *Mechanical World* (England). It is intended for practical men possessing some knowledge of chemistry as well as for students of chemistry in general. The methods of analysis described have been personally tested by the author in his extensive practice. A table of the atomic weights as recalculated by Mr. F. W. Clarke is included.

*Billings.—The Principles of Ventilation and Heating, and their Practical Application.* By John S. Billings, Surgeon, U. S. A. 72 illustrations, 216 pages, 8vo, cloth. . . \$3

The author discusses the question of ventilation and heating from various standpoints, beginning with the expense and following by an explanation of the laws which must be observed in the successful accomplishment of this work. There is next presented a very comprehensive description of the various methods of heating, together with some particulars relating to patent systems. Schools, hospitals and other public buildings which require exceptional methods are discussed, and perhaps receive a little more attention than the ordinary house. Principles are so carefully stated in all cases that their application is obvious.

*Thurston.—Materials of Engineering; Part III. Non-Ferrous Metals and Alloys.* By Prof. Robert H. Thurston; illustrated, 575 pages, 8vo, cloth. . . \$4

This is the concluding volume of a work in three parts designed for engineers, students and artisans in wood, metal and stone. Part I discusses the non-metallic materials of engineering. Part II is entitled "Iron and Steel." In the present volume the history, general processes and properties of the metals and their alloys are considered in Chapter I. In Chapter II the non-ferrous metals, copper, tin, zinc, lead, antimony, bismuth, nickel, aluminum, platinum, mercury, &c., are specially described, together with their sources, distribution and methods of reduction. The remaining twelve chapters treat in detail upon the properties of alloys, chemical and mechanical; the bronzes and brasses, their composition and uses; the kachoids, or copper-tin-zinc alloys, and the other miscellaneous alloys; the manufacture and working of alloys; the strength and elasticity of non-ferrous metals; strength of bronzes and other copper-tin alloys; strength of brasses and other copper-zinc alloys; strength of the kachoids and other copper-tin-zinc alloys; strength of zinc-tin alloys; conditions affecting strength, such as heat, change of temperature, effects of stress; and the mechanical treatment of metals and alloys; 96 tables of tests of the different materials are included and, a complete classified index accompanies the work.

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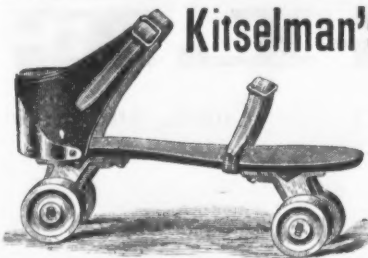
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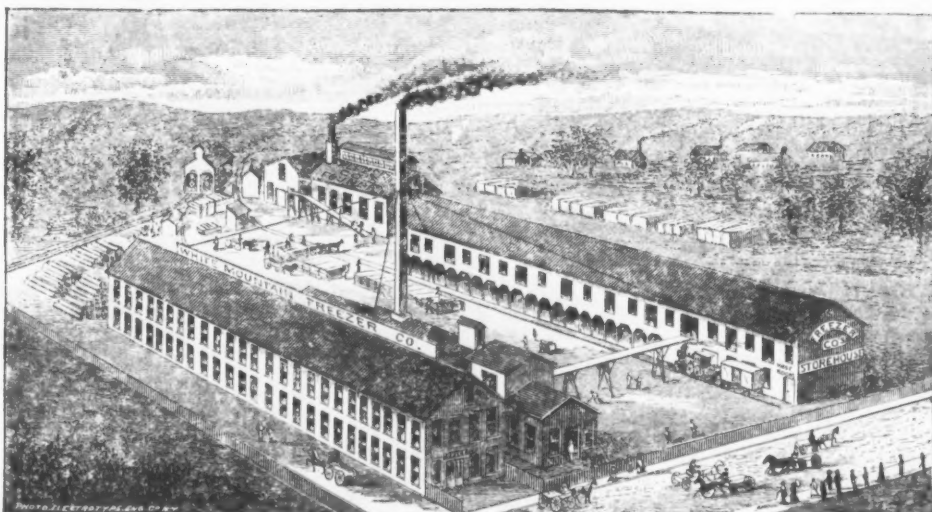


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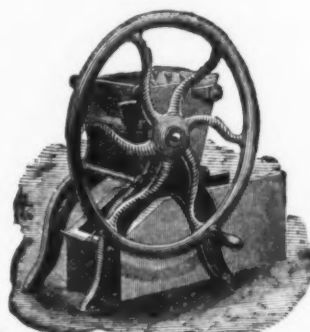
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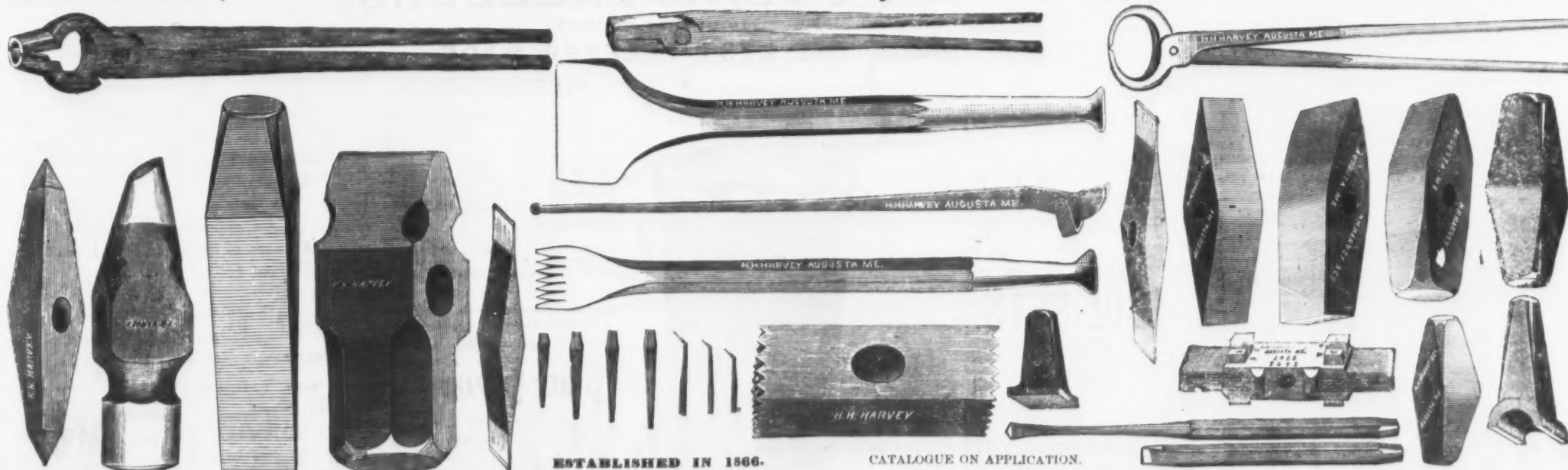
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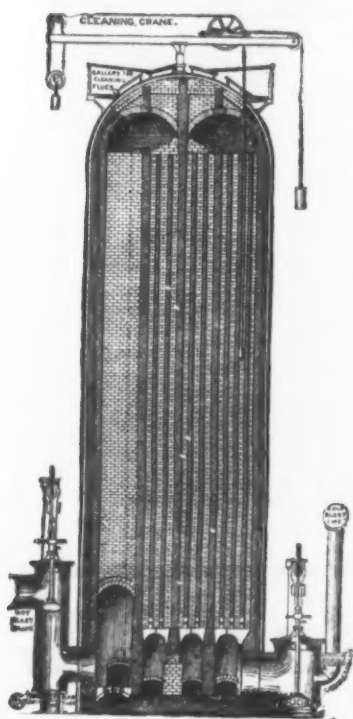
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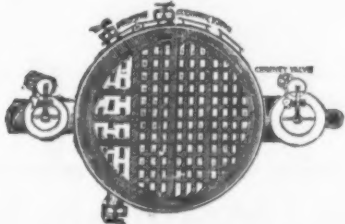
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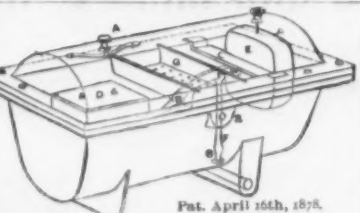


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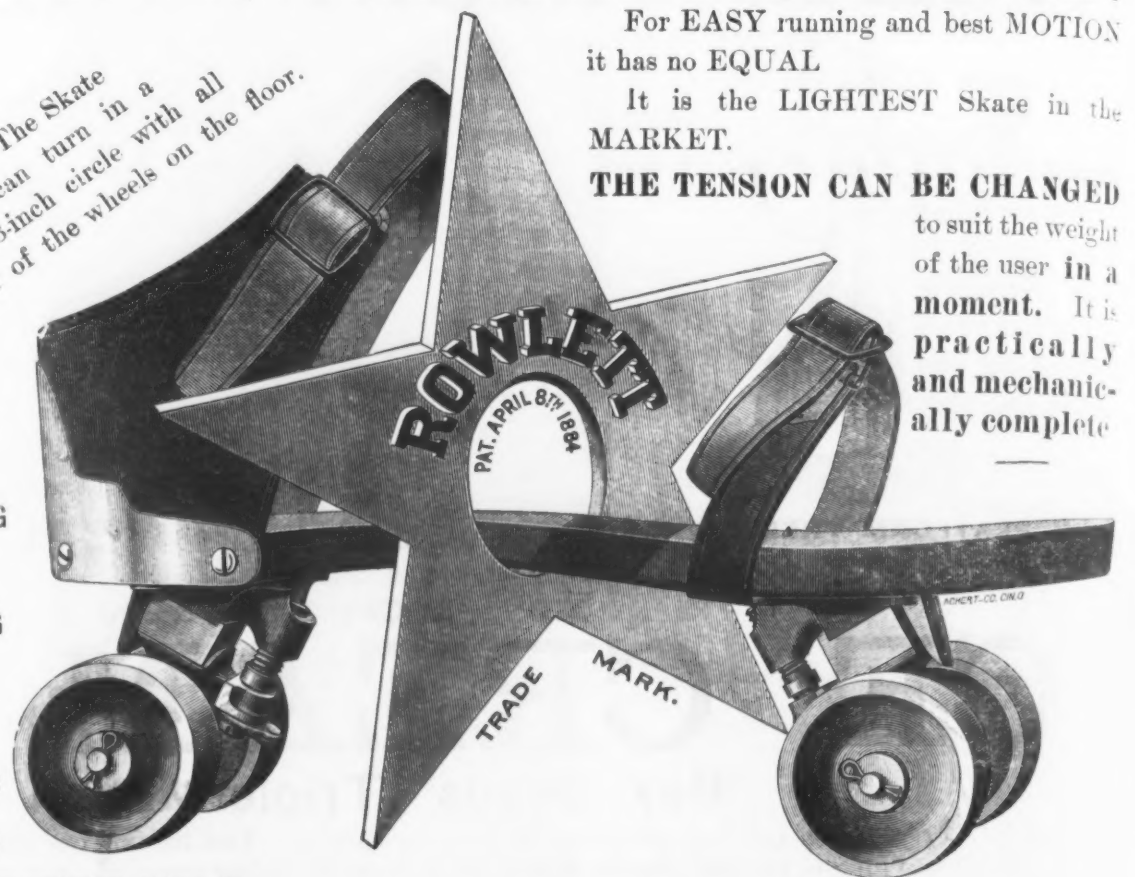
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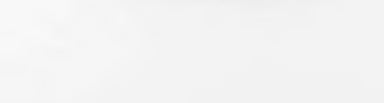
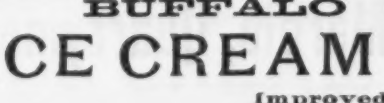
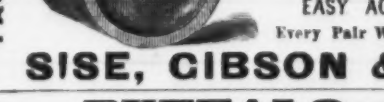
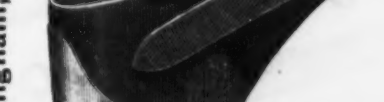
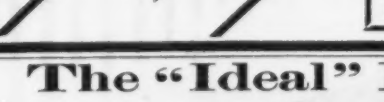
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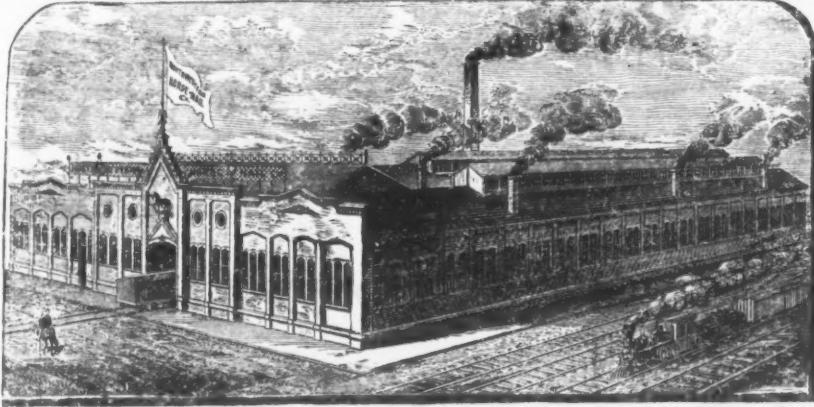


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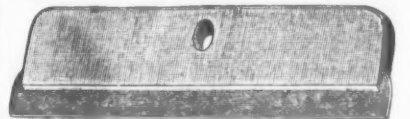


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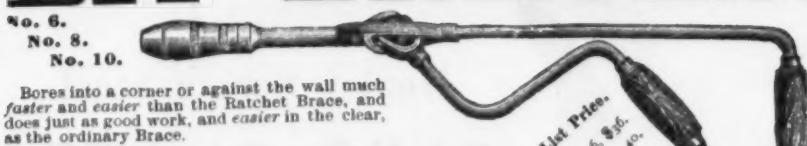
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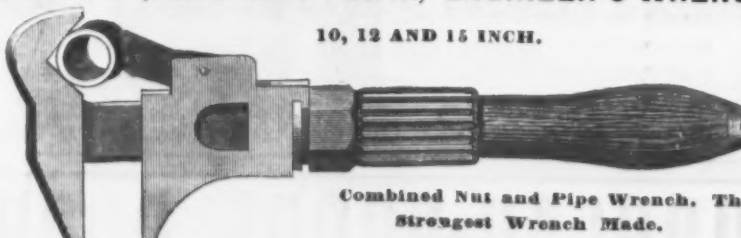
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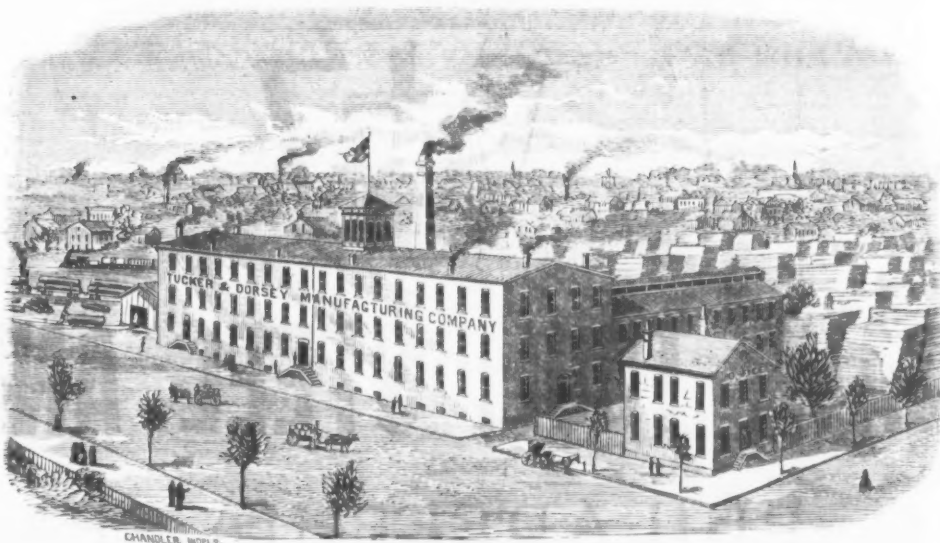
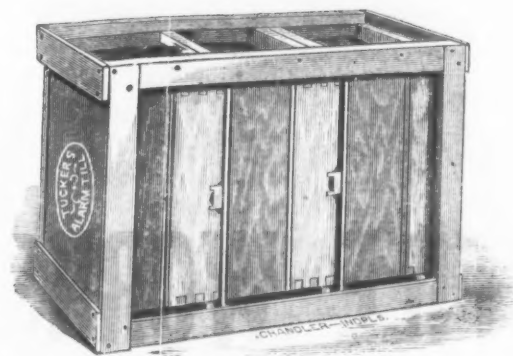
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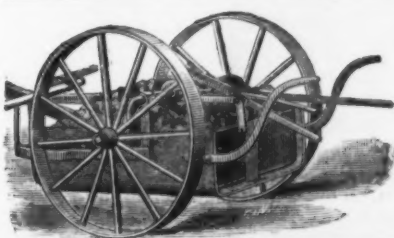
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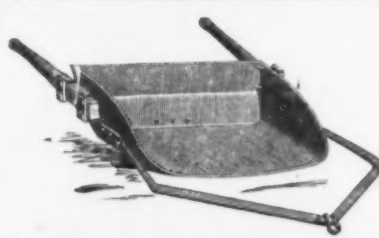
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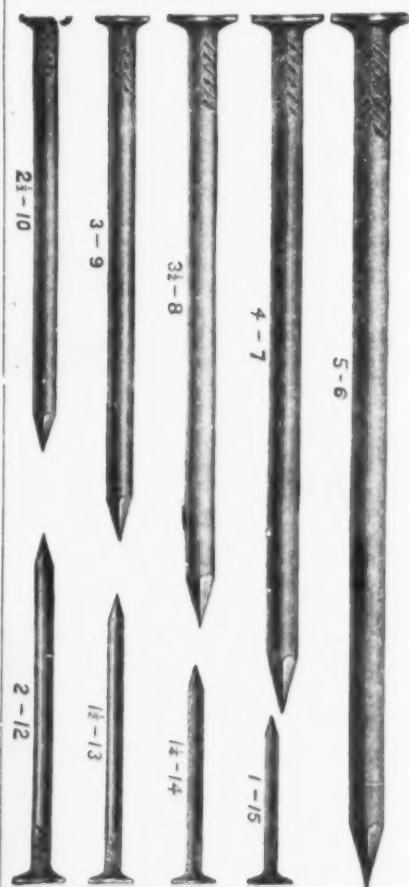
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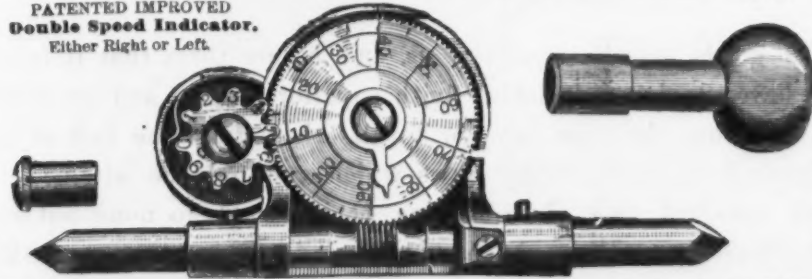
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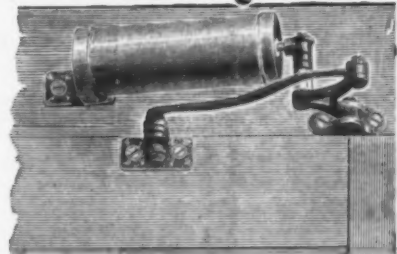
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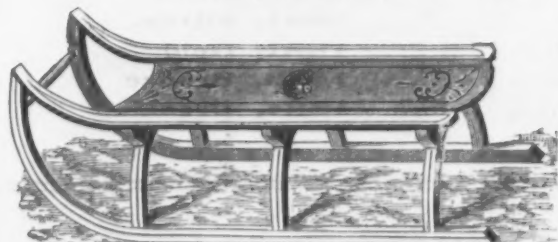
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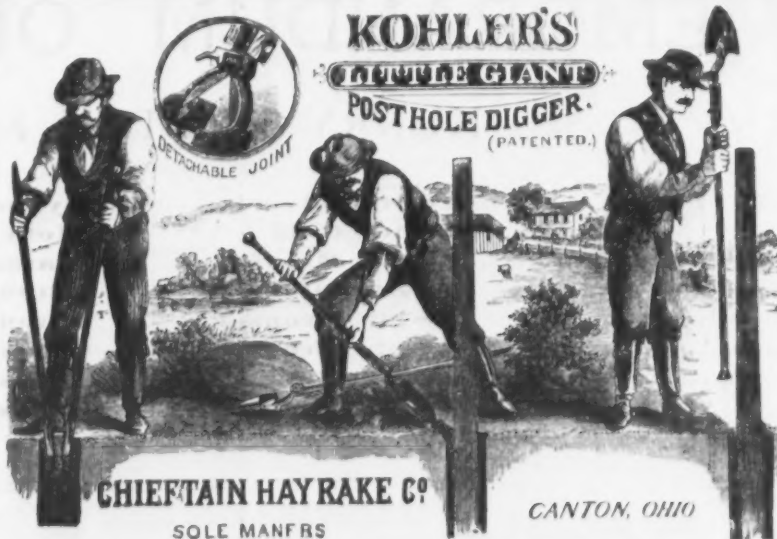
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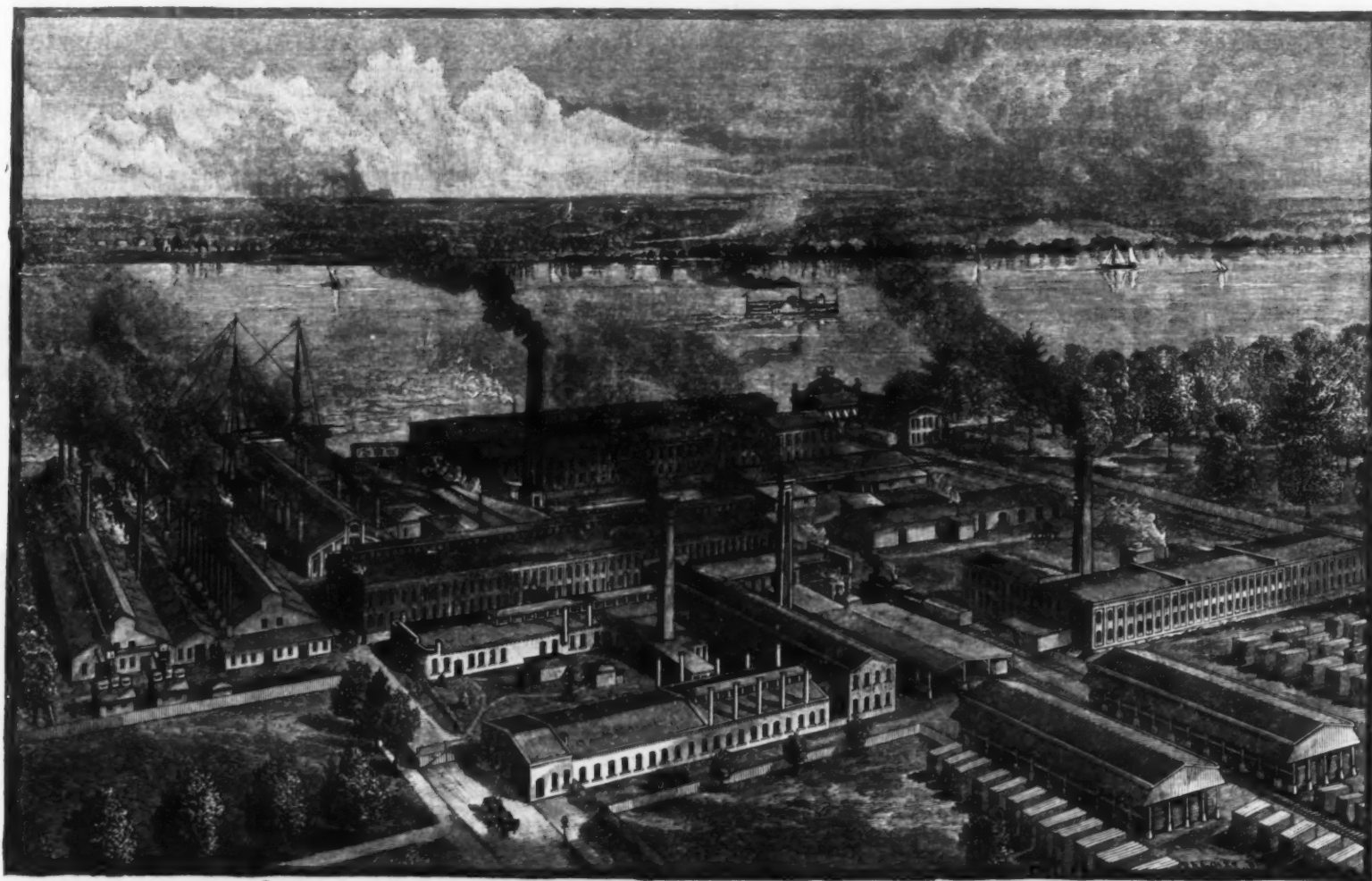
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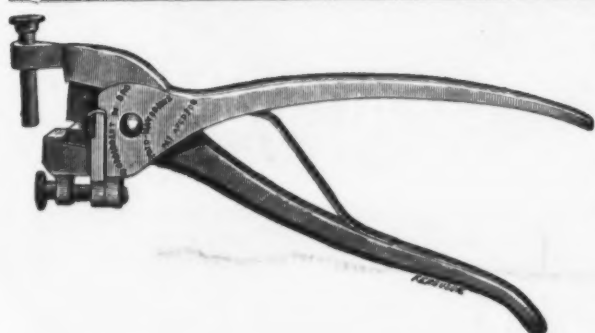
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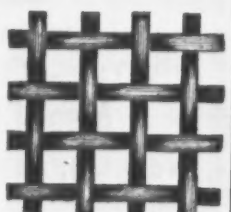
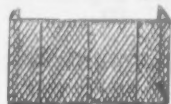
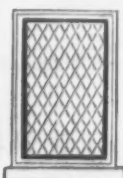
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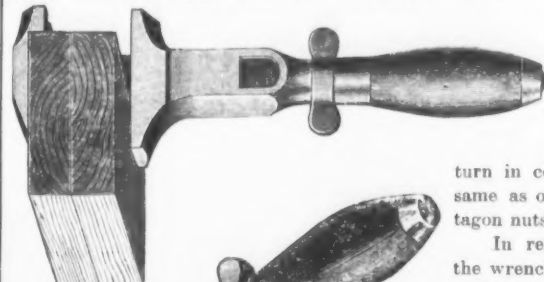
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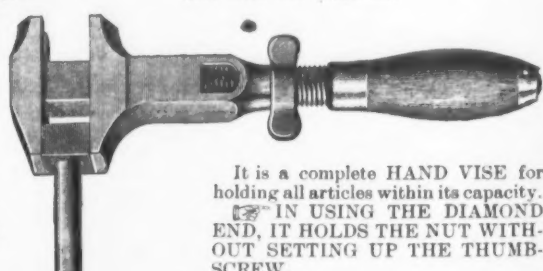
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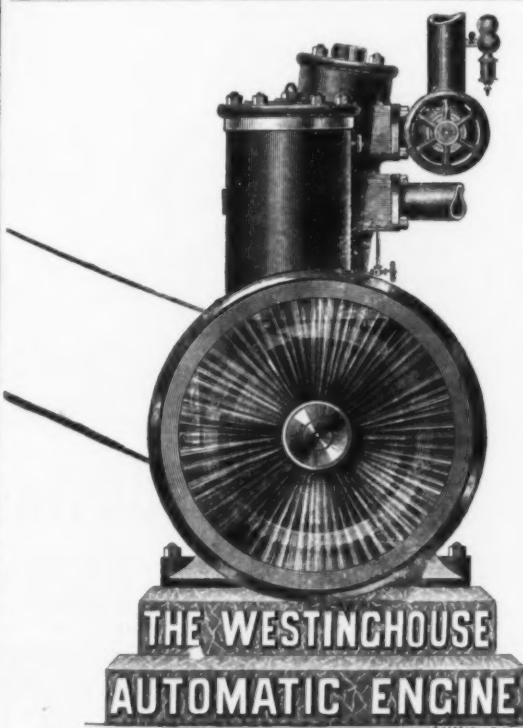


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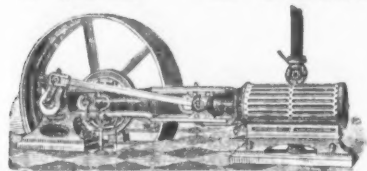
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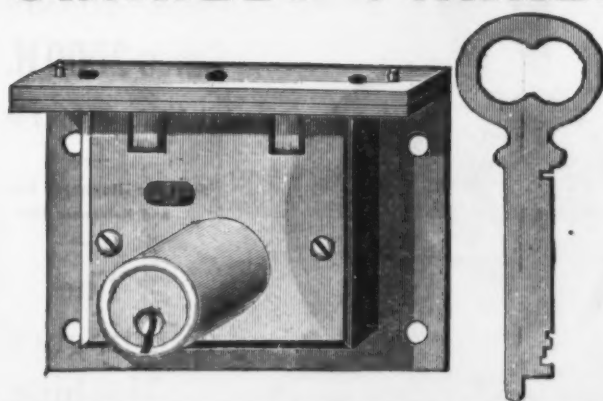
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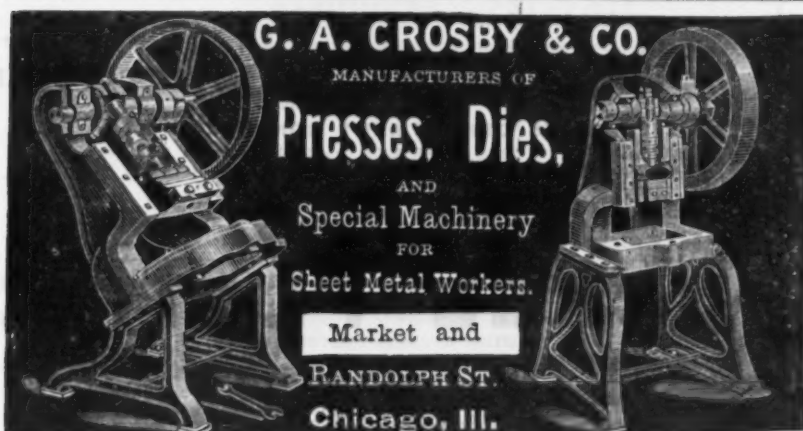
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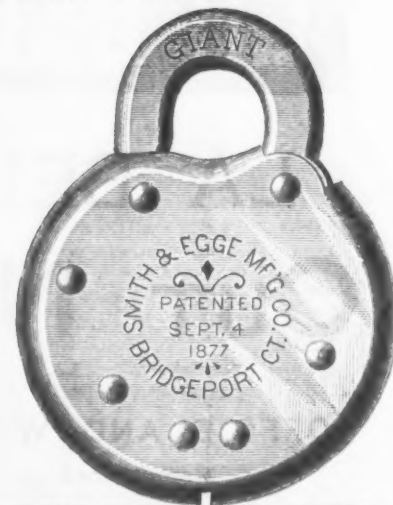
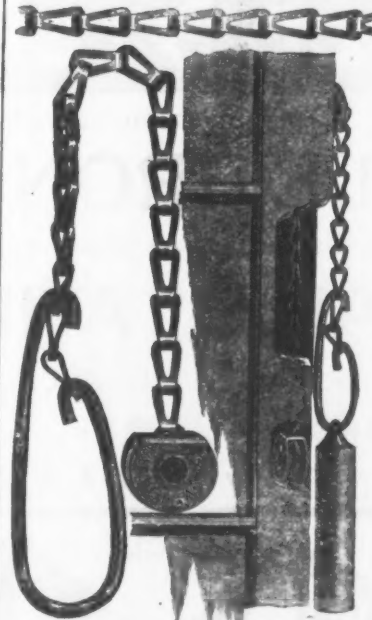
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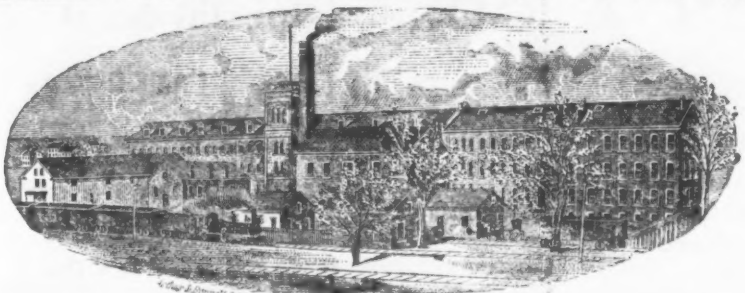
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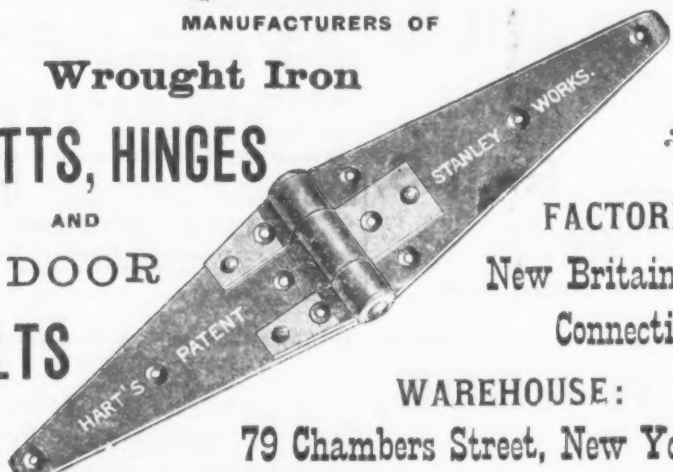


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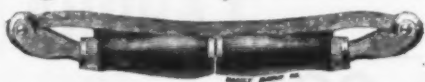
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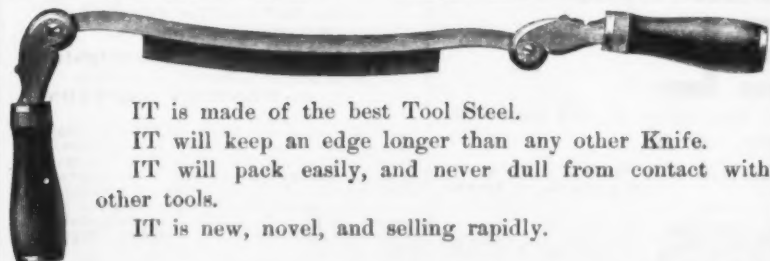
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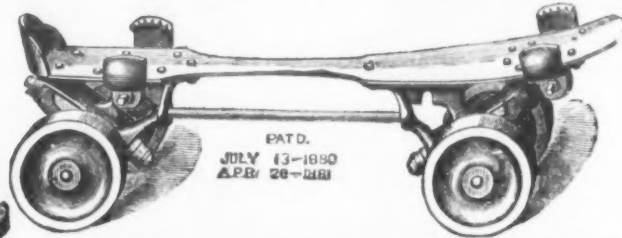
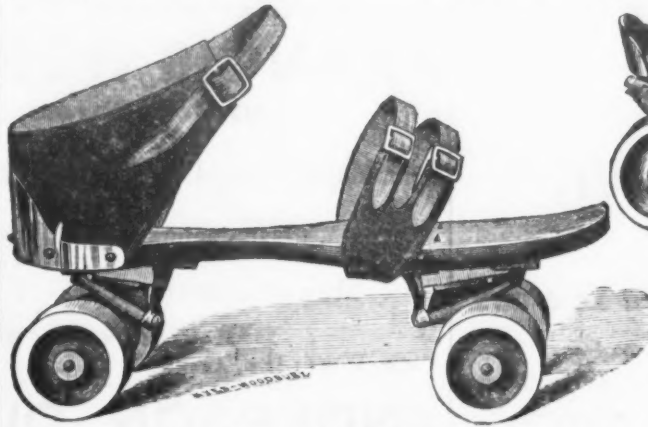


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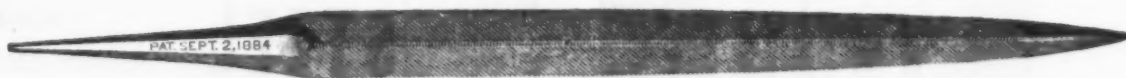
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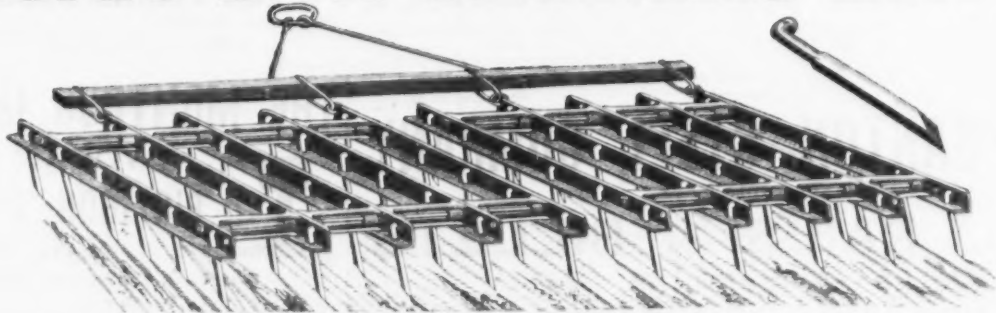


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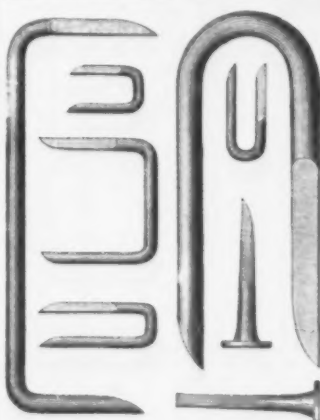
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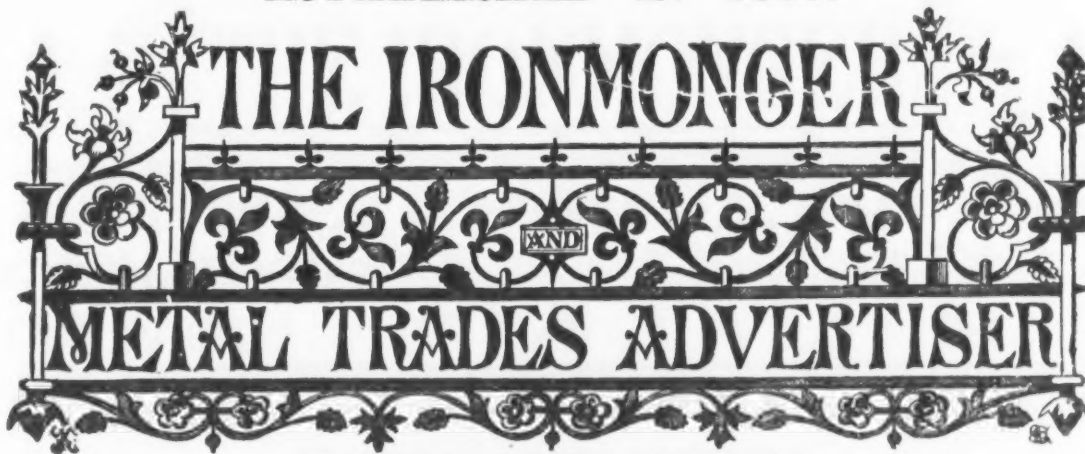
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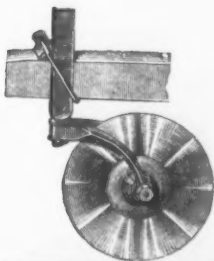
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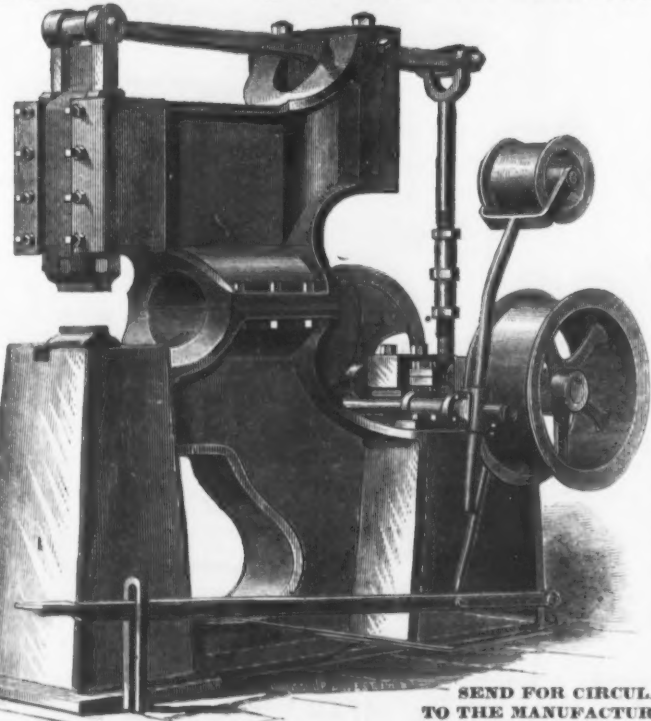
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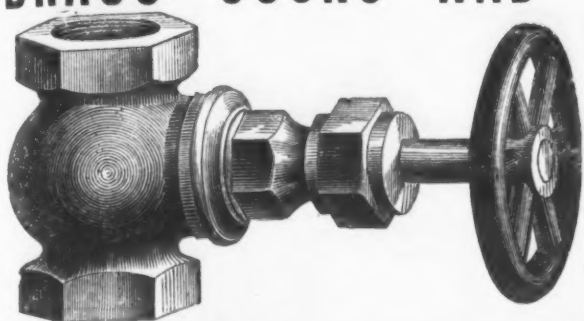
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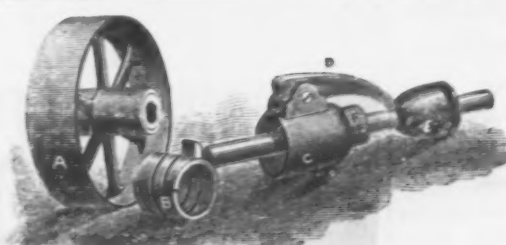
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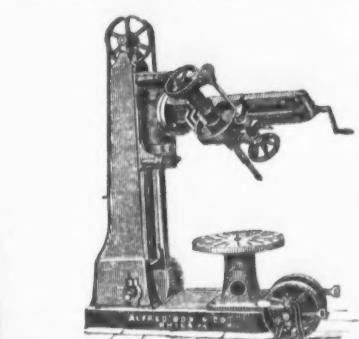
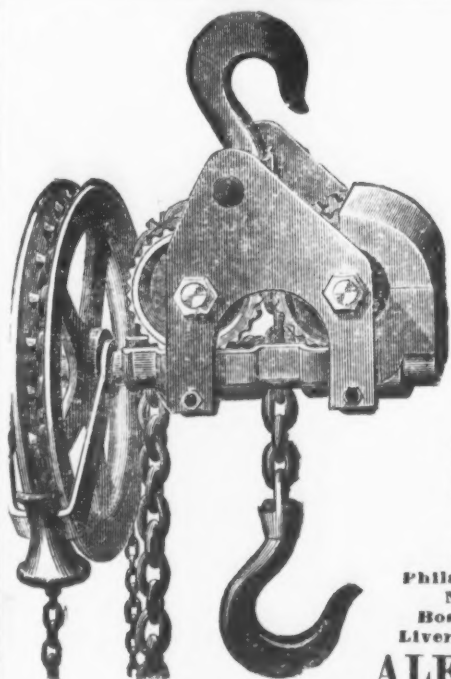
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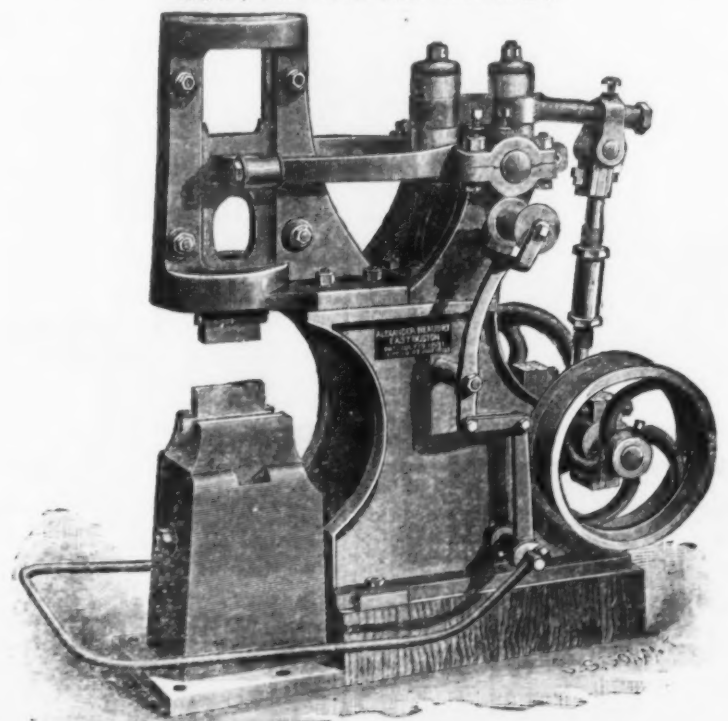
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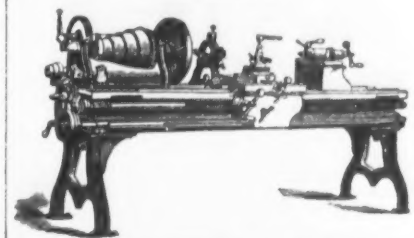
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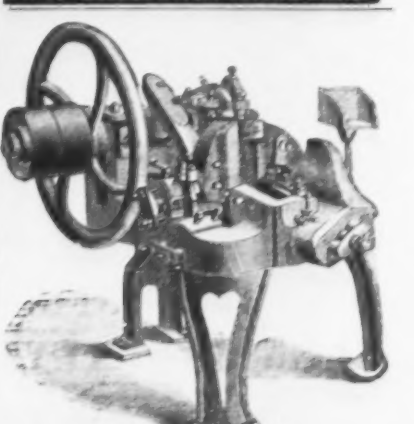
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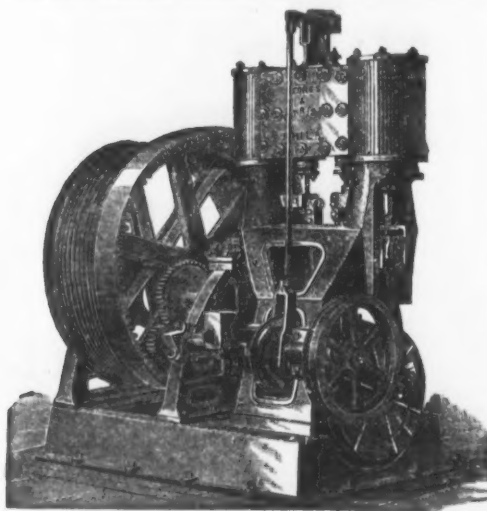
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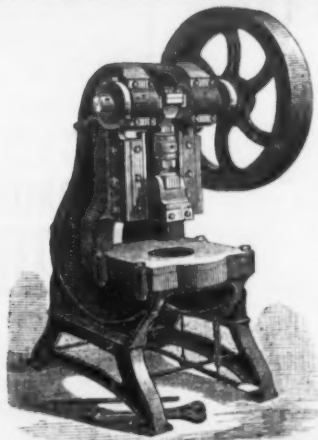
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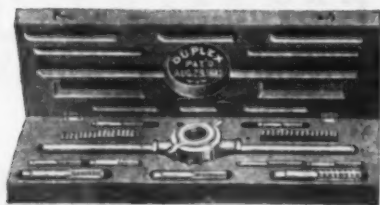
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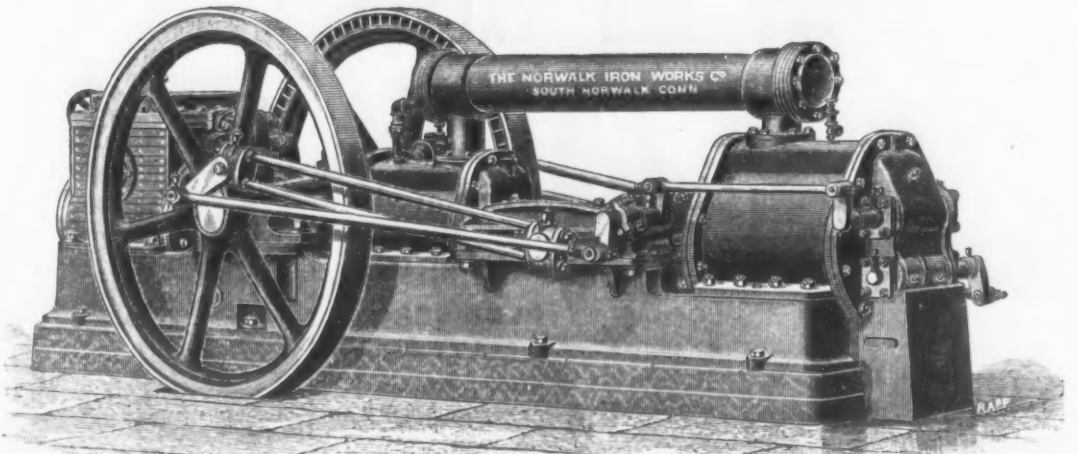
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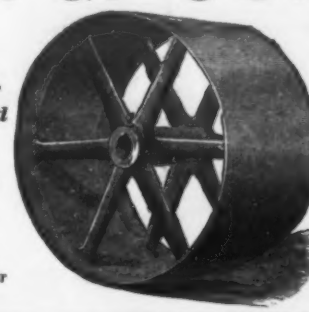
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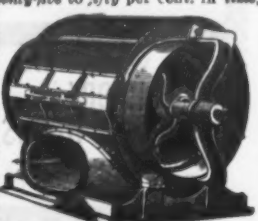


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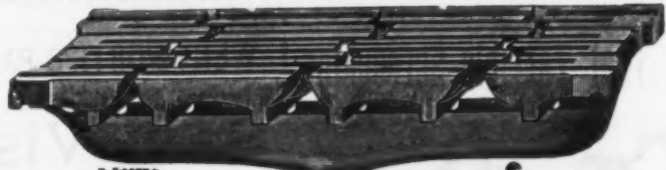
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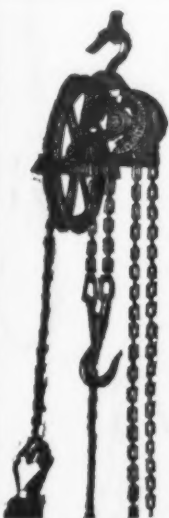
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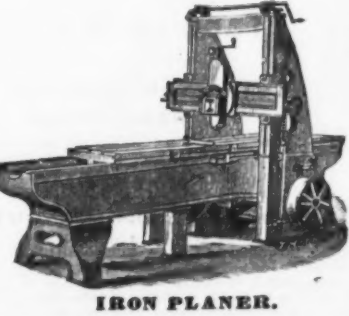
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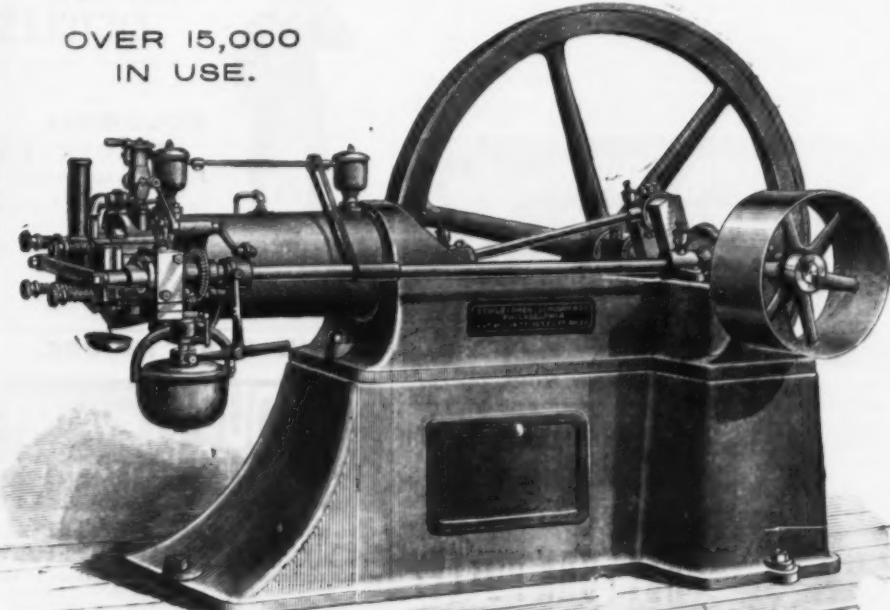
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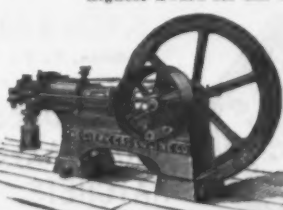
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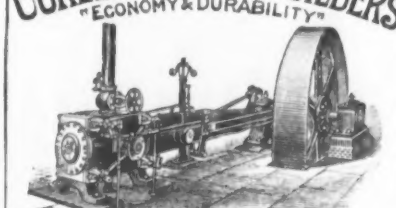
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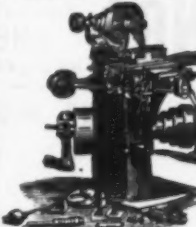
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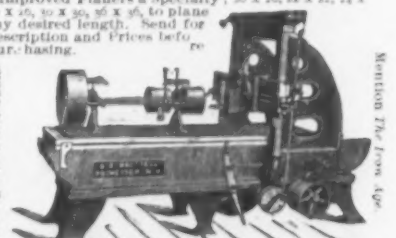
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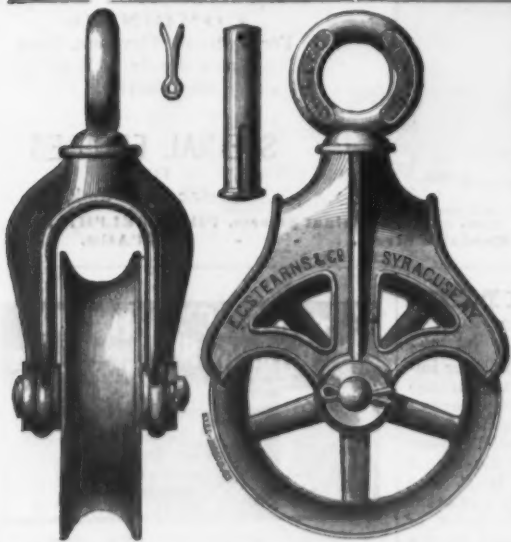
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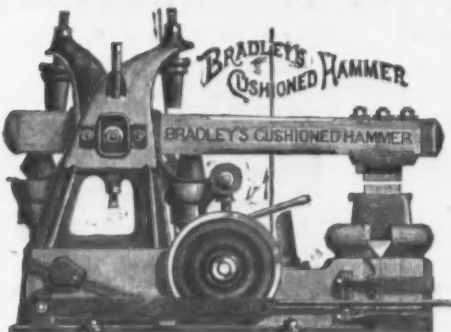
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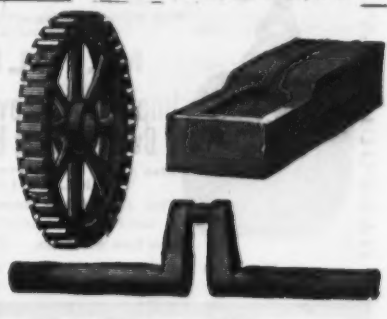
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